U. S. Government
RESEARCH REPORTS

January 20, 1962
Vol. 37, No. 2

. . available to science and industry . . .

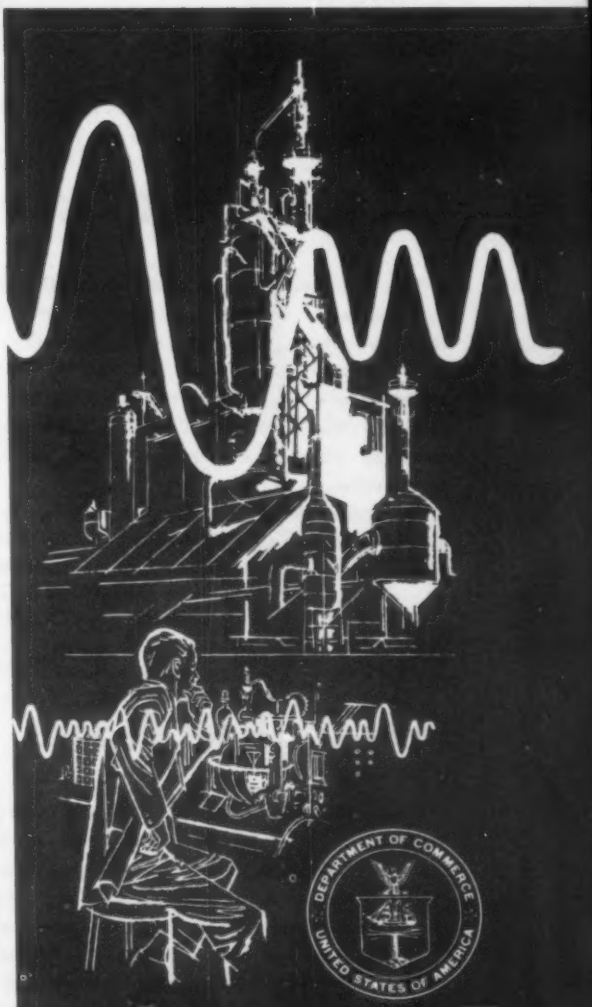
THE UNIVERSITY OF MICHIGAN
JAN 23 1962
CHEMISTRY LIBRARY

Chemistry
Z
7913
U58

The reports listed in this publication, unless otherwise noted, are available from the Office of Technical Services, U.S. Department of Commerce, at the prices indicated. They may also be ordered through Department of Commerce Field Offices.

The Office of Technical Services collects and distributes the research and development reports of the Army, Navy, Air Force, Atomic Energy Commission, and other agencies of the Federal Government for the use of private scientific and industrial firms and organizations in the development of new products and processes and in making technological improvements.

This publication is issued twice a month to announce new material available through the Office of Technical Services, which sells copies of Government reports at the cost of reproduction and handling. For additional information and ordering instructions, see inside of front cover.



U. S. DEPARTMENT OF COMMERCE
BUSINESS AND DEFENSE SERVICES ADMINISTRATION
Office of Technical Services

U.S. GOVERNMENT RESEARCH REPORTS

U.S. DEPARTMENT OF COMMERCE
Luther H. Hodges, *Secretary*

BUSINESS AND DEFENSE SERVICES ADMINISTRATION

Office of Technical Services
John C. Green, *Director*

Issued twice a month. Annual subscription $15 ($3.75 additional for foreign mailing). Single copy $1. Make remittance payable to Superintendent of Documents and mail either to a U.S. Department of Commerce Field Office or to Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. Address changes should be sent to Superintendent of Documents.

Contents may be reprinted freely. Mention of source will be appreciated.

Use of funds for printing this publication approved by the Director of the Bureau of the Budget, June 30, 1961.

U.S. Government Research Reports

This publication is issued twice a month to announce new reports of research and development released by the Army, Navy, Air Force, Atomic Energy Commission, and other agencies of the Federal Government. Unless otherwise indicated, reports listed are available from the Office of Technical Services. Some are reproduced by photo-offset printing, others by photocopy reproduction.

The first section of *U.S. Government Research Reports* is compiled by the Armed Services Technical Information Agency and is called "Technical Abstract Bulletin." (ASTIA is a Department of Defense agency which services DOD agencies and their contractors with military research information.) The next section is called "Non-Military and Older Military Research Reports." Here are listed new reports of the Atomic Energy Commission, the Office of Saline Water of the Department of Interior, and reports of other civilian agencies of the Government. In addition, this section lists military research reports not to be found in the "TAB." Most of these older military reports have been acquired by OTS in response to specific industry requests.

How To Order Reports

Almost all reports listed in *U.S. Government Research Reports* are available from the Office of Technical Services, U.S. Department of Commerce, Washington 25, D.C., or may be ordered through any Department of Commerce Field Office. Prices are given with each entry. Please use the identification numbers (AD number, PB number, AEC series number) and titles of reports when ordering. Prepayment is required. When any report is not available from OTS but from another source, the name and address of that source will be given. Direct your order to that address and not to OTS.

MICROFILM—Any reports available from the Office of Technical Services will be provided in microfilm (35 mm.) on request. The following prices are charged for microfilm: 1 through 20 pages, 80 cents minimum; and 3 cents per page for every page in excess of 20 pages.

CONTENTS

Div.		Page
	INTRODUCTION	ii
1	AIRCRAFT AND FLIGHT EQUIPMENT	1
2	ASTRONOMY, GEOPHYSICS, AND GEOGRAPHY	5
3	CHEMICAL WARFARE EQUIPMENT AND MATERIALS	8
4	CHEMISTRY	8
5	COMMUNICATIONS	10
6	DETECTION	13
7	ELECTRICAL EQUIPMENT	15
8	ELECTRONICS AND ELECTRONIC EQUIPMENT	19
9	FLUID MECHANICS	31
10	FUELS AND COMBUSTION	38
11	GROUND TRANSPORTATION EQUIPMENT	41
12	GUIDED MISSILES	41
13	INSTALLATIONS AND CONSTRUCTION	44
14	MATERIALS (NON-METALLIC)	45
15	MATHEMATICS	50
16	MEDICAL SCIENCES	52
17	METALLURGY	56
18	MILITARY SCIENCES AND OPERATIONS	64
19	NAVIGATION	65
20	NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY	65
21	NUCLEAR PROPULSION	72
22	ORDNANCE	72
23	PERSONNEL AND TRAINING	74
24	PHOTOGRAPHY AND OTHER REPRODUCTION PROCESSES	74
25	PHYSICS	74
26	PRODUCTION AND MANAGEMENT	85
27	PROPULSION SYSTEMS	88
28	PSYCHOLOGY AND HUMAN ENGINEERING	91
29	QUARTERMASTER EQUIPMENT AND SUPPLIES	92
30	RESEARCH AND RESEARCH EQUIPMENT	94
31	SHIPS AND MARINE EQUIPMENT	97
32	MISCELLANEOUS ARTS AND SCIENCES	98
33	TRANSPORTATION	98

CONTENTS (CON.)

NON-MILITARY AND OLDER MILITARY RESEARCH REPORTS

	Page
ASTRONOMY	S- 1
BEHAVIORAL SCIENCES	S- 1
BIOLOGICAL SCIENCES	S- 2
EARTH SCIENCES	S- 5
ENGINEERING	S- 7
FOOD, HANDLING, AND PACKAGING EQUIPMENT	S-18
MACHINERY, FABRICATION, AND ACCESSORY EQUIPMENT	S-19
MATERIALS	S-19
MATHEMATICS	S-20
MECHANICS	S-22
METALLURGY	S-24
NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY	S-27
PERSONNEL SUPPLIES AND PERSONAL EQUIPMENT	S-32
PHYSICS	S-33
RESEARCH METHODS, TECHNIQUES AND EQUIPMENT	S-39
SOCIAL SCIENCES	S-40
MISCELLANEOUS	S-41
AD INDEX	S-43
NUMBER INDEX	S-45

THIS ISSUE INCLUDES:

TAB 62-1-2
AD 265500 - AD 266099

Included in this issue are publications available from GPO. Orders should be addressed to: Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

TECHNICAL ABSTRACT BULLETIN

1. AIRCRAFT AND FLIGHT EQUIPMENT

AD-265 569 Div. 1, 9
(TIPTA/CDM) OTS price $13.50

Vertol Div., Boeing Airplane Co., Morton, Pa.
VERTODYNE FAN-IN-WING VTOL AIRCRAFT.
Final summary rept.,
by E. Brogan, G. Casey and others. 15 July 61, 191p. incl. illus. tables, 22 refs. (Rept. no. N-254)
(Contract Nonr-236400)

Unclassified report

DESCRIPTORS: (*Vertical take-off planes, *Shrouded propellers, *Wings, Design.) (Airfoils, Wind tunnel models, Tests, Model tests.)

The Vertodyne test program was conducted to determine the static and transition flight characteristics of a wing-submerged ducted lift fan. Static tests were performed. Tests were conducted in ground effect at various heights, and out of ground effect. Foward flight tests were conducted in the wind tunnel. A semi-span reflection plate type model suitable for testing in a seven foot by ten foot wind tunnel was designed. A mechanically driven ducted fan was used, with all drive components contained within the basic wing contour. Three interchangeable fan impellors, high pitch, medium pitch, low pitch provided variation in fan thrust. The test set-up was provided with instrumentation which measured forces and moments on the model support and thrust and torque on the fan shroud. Wing surface pressure pickups provided data for a study of surface pressure distributions. The results of the Vertodyne test program are presented to facilitate their application to future studies and designs and to permit comparison with other investigations. Basic knowledge of the flight characterisitcs of the Vertodyne configuration was gained indicating the direction in which further research is necessary. (Author)

AD-265 586 Div. 1
(TIPTB/CCD) OTS price $5.60

Bell Helicopter Corp., Fort Worth, Tex.
A STUDY OF SIMULATED ROTARY WING HOVERING PERFORMANCE AS A FUNCTION OF SYMBOL HEADING USING A MOVING SYMBOL-FIXED MAP PICTORIAL POSITION DISPLAY.
Technical data rept. on ANIP, Army-Navy Instrumentation Program,
by D. J. Dougherty, B. A. Abbot, and W. G. Matheny. Sep 61, 46p. incl. illus. tables
(Rept. no. D228-421-500)
(Contract Nonr-167000)

Unclassified report

DESCRIPTORS: *Vertical take-off planes, *Helicopters, Convertible airplanes, Flight testing, Simulation, Tests, *Display systems, Instrumentation, Ground effect, Maps, Position finding, Ground position indicators, Pilots, Human engineering.

This report describes the first in a series of studies in the ANIP program designed to examine rotary-wing, VTOL and GEM system requirements for pictorial position displays. This study was designed to examine the ANIP display philosophy and the rotary wing maneuvering capabilities in an experiment which would permit comparison with research results of fixed-wing studies. The purpose of this study was to examine pilot performance in maintaining hovering position when using a simplified simulated rotary-wing flight system. The experimental variables were: symbol heading on a fixed map-moving aircraft symbol display, and inclusion of an earth grid attitude display (contact analog or vertical display). (Author)

AD-265 604 Div. 1
(TIPTB/CCH) OTS price $2.60

Air Force Flight Test Center, Edwards Air Force Base, Calif.
AFSC FLIGHT EVALUATION OF F-100, TYPE III 335-GALLON EXTERNAL FUEL TANK,
by Laurence P. Colburn and Albert H. Crews. Oct 61, 18p. incl. illus. (Rept. no. AFFTC TR 61-57)

Unclassified report

DESCRIPTORS: (*Fuel tanks, Airborne, Design, Effectiveness in Aircraft.) (Tests, Flight testing, Load distribution, Operation, Analysis.)

This report presents the results of an evaluation of 335-gallon external fuel tanks for use with the F-100 aircraft. Testing was completed on 18 August 1961. Flutter tests were conducted to qualify the design limit airspeeds with the tanks installed. The specified limits were reached without onset of sustained flutter. Symmetrical and unsymmetrical design load limits were demonstrated with varied fuel loadings. The limit loads were achieved with no signs of tank shifting or damage. Sixteen tanks were dropped to define conditions for safe tank release with outboard stores installed and with Type III pylons outboard. Tank drops with outboard stores were generally unsatisfactory. A safe airspeed-altitude envelope for drops with Type III pylons outboard was defined. A baffle check valve modification, provided to prevent excess forward or aft fuel loading of the tank, was evaluated. The modification increased airspeed and structural limits with the 335-gallon tanks partially full. Design limit airspeed and structural limits were successfully demonstrated with the modified tanks. Performance of the F-100D with the 335-gallon tanks was evaluated and results will be presented in a separate report. The 335-gallon tanks proved satisfactory for operational use with minor exceptions as noted. (Author)

AD-265 630 Div. 1, 14
(TIPTB/CCH) OTS price $6.60

Army Engineer Waterways Experiment Station, Vicksburg, Miss.
ENGINEERING TESTS OF T12 PLASTIC AIRPLANE LANDING MAT,
by Robert Turner. May 61, 62p. incl. illus. tables (Technical rept. no. 3-563)
Unclassified report

DESCRIPTORS: (*Plastics, *Landing mats, Design, Mechanical properties, Stresses.)

An experimental, commercially fabricated, plastic landing mat designated the T12 was subjected to laboratory tests to determine its structural properties and engineering traffic tests to compare its performance with that of standard M8 steel mat and with project requirements. The laboratory tests indicated that because of fabrication deficiencies the structural properties of the T12 mat were less than considered necessary to fulfill project traffic requirements (700 coverages of 50,000-lb wheel lead with mat placed on subgrade with CBR of 15). Traffic tests (loads of 25,000-50,000 lb, tire pressures of 100-200 psi, on mat-surfaced subgrades with CBR's of 15-17) revealed that the T12 mat as fabricated will not meet project requirements but will sustain two weeks emergency operational category traffic (40 coverages, 50,000-lb load). It is concluded that plastic mat meeting project requirements can be fabricated commercially, and it is recommended that the T12 mat design be modified to incorporate improved connectors and materials and such other improvements as discussed herein and that engineering tests be conducted of the revised design. (Author)

AD-265 632 Div. 1
(TIPTA/EET) OTS price $1.10

Beech Aircraft Corp., Wichita, Kans.
PROTOTYPE DEVELOPMENT MODEL 385 AIR REFUELING STORE,
Interim rept. no. 13, 1-30 June 61,
by C. V. Lassmann. 7 July 61, 4p. (Engineering rept. no. 4168)
(Contract NOw 60-0060-c)
Unclassified report

DESCRIPTORS: (*Refueling in flight, Bombers, Airplane protuberances, Aircraft equipment, Booms, Fuel systems, Specifications, Design, Tests.)

Development of the Beech Model 385 Air Refueling Store has continued with satisfactory progress. Work has continued on design development of the prototype store. Evaluation testing of various types of refueling hose is presently in process. (Author)

AD-265 641 Div. 1, 13
(TIPTM/EJH) OTS price $1.10

Fenwal, Inc., Ashland, Mass.
LIGHT WEIGHT FIRE EXTINGUISHING SYSTEM.
Interim bi-monthly progress rept. no. 5, 1 Aug-1 Oct 61,
by Parker Peterson. 1 Oct 61, 4p.
(Contract NOw 61-0243-c)
Unclassified report

DESCRIPTORS: (*Fire extinguishers, Aircraft equipment, Aircraft, Design.) (*Gas generating systems, Propellants, Design, Materials, Aluminum, Valves, Pipes, Pipe fittings.) (*Aircraft fires, Fires, Chemicals, Storage.) Tests, Military requirements.

Final design of the gas generator and discharge valve was completed. Environmental testing was completed and prototype units are undergoing functional evaluation in the single-shot system configuration. Procurement of prototype cross-over valves was initiated. Design of special adaptors and fittings is complete. (Author)

AD-265 643 Div. 1, 13
(TIPTM/EJH) OTS price $1.60

Fenwal, Inc., Ashland, Mass.
LIGHT WEIGHT FIRE EXTINGUISHING SYSTEM.
Interim bi-monthly progress rept. no. 4, 1 June-1 Aug 61,
by Parker Peterson. 31 July 61, 7p. illus.
(Contract NOw 61-0243-c)
Unclassified report

DESCRIPTORS: (*Fire extinguishers, Aircraft equipment, Aircraft, Design.) *Gas generating systems, Propellants, Design; Valves, High temperature research, Low temperature research, Shock resistance, Vibration.) (*Aircraft fires, Fires, Chemicals.) Tests, Test methods, Military requirements.

Preliminary design of the gas generator, cross-over valve and discharge valve were completed. Environmental testing is well under way and procurement of prototype gas generators is in process. (Author)

AD-265 655 Div. 1, 14
(TIPTM/BRW) OTS price $2.60

Goodyear Aircraft Corp., Akron, Ohio.
EVALUATION OF HIGH-TEMPERATURE CAST-IN-PLACE TRANSPARENT PLASTIC LAMINATES SUITABLE FOR CANOPIES ON SUPERSONIC FIGHTER AIRCRAFT.
Quarterly progress rept. no. 7, 9 Nov 60-8 Feb 61. 8 Feb 61, 22p. incl. illus. table.
(Rept. no. GER 10378)
(Contract NOa(s) 59-6146-c)
Unclassified report

DESCRIPTORS: (*Aircraft canopies, *Transparent panels, Plastics, *Laminates, Materials, Heat resistant polymers, Epoxy resins, Thermal insulation, Casting, Feasibility studies, Tests.) (Supersonic planes, Jet planes, Jet fighters.) (Aircraft canopies, Windshields, Production, Design, Thermal stresses, Shock resistance, Mechanical properties.)

Wind tunnel tests conducted at Mach 2.75 conditions on as cast Plex 55 indicated that no rippling or flow of the surface will occur in a high-speed air stream. Flexural and tensile properties were obtained for the epoxy thermal barrier material. Operational temperature cycle testing at Test C conditions was continued. Several premature specimen failures were experienced, but the test specimen configuration was redesigned to eliminate this tendency to failure, and new test specimens are now ready for testing. No forming or laminating attempts were made during this period on either the canopy or windshield side panel. The no. 1 side panel casting indicated that a different type of forming mold would be required for this portion of the program. The new mold has been fabricated and is nearly ready for use. (Author)

AD-265 657 Div. 1, 14
(TIPTM/BRW) OTS PRICE $5.60

Goodyear Aircraft Corp., Akron, Ohio.
EVALUATION OF HIGH-TEMPERATURE CAST-IN-PLACE TRANSPARENT PLASTIC LAMINATES SUITABLE FOR CANOPIES ON SUPERSONIC FIGHTER AIRCRAFT.
Quarterly progress rept. no. 8, 9 Feb-8 May 61. 8 May 61, 46p. incl. illus. tables (Rept. no. GER 10379)
(Contract NOa(s) 59-6146-c)
Unclassified report

DESCRIPTORS: (*Aircraft canopies, *Transparent panels, Plastics, *Laminates, Materials, Heat resistant polymers, Epoxy resins, Thermal insulation, Casting, Feasibility studies, Tests.) (Supersonic planes, Jet planes, Jet fighters.) (Aircraft canopies, Windshields, Production, Design, Thermal stresses, Shock resistance.)

Screening tests reduced the field of potential thermal barriers to laminating-grade as cast Plex 55 and epoxy, which are nearly equal in performance. Because the epoxy material is still in the developmental stage and cannot be obtained in large enough sheet sizes to fabricate test canopies, as cast Plex 55 was selected as the thermal-barrier material for testing. The optical and fabrication feasibility of full-scale Thermo-shield canopies was successfully demonstrated. Forming techniques were established for the new windshield side-panel forming mold. Excellent optical quality was achieved in the monolithic side-panel shells, and efforts will be directed to laminating the side panels. (Author)

AD-265 658 Div. 1, 9
(TIPTA/EET) OTS price $9.60

Goodyear Aircraft Corp., Akron, Ohio.
AUTO-TRIM VTOL FEASIBILITY STUDY.
Final rept.
18 Sep 61, 113p. incl. illus. tables, 11 refs.
(Rept. no. GER-10409)
(Contract NOw 60-0313-c)
Unclassified report

DESCRIPTORS: (Reconnaissance planes, Scout planes, *Verticle take-off planes, Wings, Aerodynamic configurations, Flaps, Deflection, *Control systems, Stability (Longitudinal), Design, Feasibility studies, Tests.) (Wind tunnel models, Model tests, Wings.)

The Auto-Trim concept makes use of the wing flap as an aerodynamic servo to change the wing attitude relative to the fuselage during the transition from hovering to forward flight. The system feasibility was established by semi-empirical analytical methods and analyses of static wind tunnel test data. The longitudinal dynamic equations of motion for stability and control characteristics studies were developed.

AD-265 681 Div. 1, 33
(TIPTB/CCH) OTS price $1.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
THE LOADING AND LOAD CENTERING INSTRUCTIONS FOR TU-104 AND TU-104A AIRCRAFT (SUPPLEMENT).
comp. by M. V. Lipatov. 19 Sep 61, 13p. incl. tables (Trans. no. MCL-1106 of Dopolneniye k Instruktsii po Zagruzke i Tsentrovke Samoletov Tu-104 I Tu-104A, Moskva:pp. 1-12, 1958)
Unclassified report

DESCRIPTORS: (*Loading *Instruction manuals of Aircraft, *Commercial planes, *Transport planes.) (*Cargo, Handling.) (Air transportation, Translations, USSR.)

AD-265 751 Div. 1
(TIPTA/EET) OTS price $1.60

Beech Aircraft Corp., Wichita, Kans.
PROTOTYPE DEVELOPMENT MODEL 385 AIR REFUELING STORE.
Interim rept. no. 16, 1-30 Sep 61,
by C. V. Lassmann. 6 Oct 61, 9p. incl. illus.
(Engineering rept. no. 4237)
(Contract NOw 60-0060-c)
Unclassified report

DESCRIPTORS: (*Refueling in flight, Bombers, Fuel systems, Fuel pumps, Fuel hose, Valves, Design, Test methods, Tests.) (Aviation fuels, Cut-off valves, Control valves.) (Reliability, Wind tunnels, Flutter, Model tests, Booms, Airplane protuberances,) (Airplane protuberances, Manufacturing methods.)

Work is in process on fabrication of the prototype stores. Wind tunnel tests of a flutter model of the store have been completed; results indicate that the configuration is satisfactory throughout the operational envelope with all the proposed tanker airplanes. Fuel system tests indicate a redesign of the flow regulator. (Author)

AD-265 781 Div. 1, 6
(TIPTA/CRJ) OTS price $5.60

Naval Ordnance Test Station, China Lake, Calif.
THE INFRARED RADIANT INTENSITY OF SEVERAL SMALL PROPELLER-DRIVEN AIRCRAFT (U),
by L. W. Nichols. 12 Sep 60, 54p. incl. illus. tables (Rept. no. IDP-973)
Unclassified report

DESCRIPTORS: (*Airplanes, *Infrared radiation, Thermal radiation, Measurement, Radiometers, Intensity.) Civil aviation.

A series of 10 different propeller-driven aircraft were measured by the Naval Ordnance Test Station to determine their infrared radiant intensities for various aspects. These measurements were sponsored by the Federal Aviation Agency to ascertain if sufficient radiation was emitted by commonly-encountered aircraft to offer a means of developing an infrared collision-warning device. The aircraft models selected for measurement were chosen by the Federal Aviation Agency as representative types of small civilian and commercial airplanes. They included both single and twin-engine aircraft. The measurements were made by means of a ground-based radiometer which recorded the infrared irradiance from various aircraft flying planned patterns above it. The radiation emitted by the aircraft was measured in the 2-3 micron wavelength band and the 3-6 micron wavelength band. (Author)

AD-265 795 Div. 1, 33
(TIPTA/DLW) OTS price $2.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
AVIATION REVIEW (SELECTED ARTICLES).
22 Sep 61, 22p. incl. illus. (Trans. no. MCL-1414 of Letecky Obzor 6:pp. 176-179, 181-182, and 186 1961)
Unclassified report

DESCRIPTORS: (Airplanes, *Commercial planes, *Transport planes, Hydraulic systems, Fatigue (Mechanics), Vibration, Economics, Design.) (Technological intelligence, USSR, Czechoslovakia, Translations.)

Contents:
Fatigue of supporting structures of transport aircraft
Break in pipe line of an aircraft hydraulic system by the effect of vibration
The AN-24 aircraft

AD-265 889 Div. 1, 9
(TIPTP/MFA) OTS price $1.25

National Aeronautics and Space Administration, Washington, D. C.
THE EFFECT OF LATERAL-DIRECTIONAL CONTROL COUPLING ON PILOT CONTROL OF AN AIRPLANE AS DETERMINED IN FLIGHT AND IN A FIXED-BASE FLIGHT SIMULATOR,
by Richard F. Vomaske, Melvin Sadoff, and Fred J. Drinkwater, III. Nov 61, 44p. incl. illus. tables (NASA Technical note D-1141)
Unclassified report

Also available from NASA, Wash. 25, D. C., as NASA Technical note D-1141.

DESCRIPTORS: (*Pilots, *Control, *Attitudes, Jet fighters, Flight testing, *Flight simulators, Stability, Damping, Yaw.) (Analog computers, Experimental data, Photographs, Tables.) (Equations of Motion.)

A flight and simulator study has been conducted at several conditions of Dutch roll damping to determine the effect on pilot opinion of a wide range of favorable and adverse yawing moment due to aileron deflection. Objectives of this report are: (1) to define the maximum acceptable levels of aileron-induced yawing moments, (2) to assess the effect of lack of motion cues in a fixed-base flight simulator, and (3) to evaluate several lateral-directional handling qualities parameters. (Author)

AD-265 914 Div. 1, 9
(TIPTP/MFA) OTS price $.75

National Aeronautics and Space Administration, Washington, D. C.
EFFECTS OF GYROSCOPIC CROSS COUPLING BETWEEN PITCH AND YAW ON THE HANDLING QUALITIES OF VTOL AIRCRAFT,
by John F. Garren, Jr. Nov 61, 21p. incl. illus. tables (NASA Technical note no. D-973)
Unclassified report

Also available from NASA, Wash. 25, D. C., as NASA Technical note no. D-973.

DESCRIPTORS: (Gyroscopes, *Pitch *Yaw, Handling, Helicopters, *Vertical take-off planes, Flight simulators, Flight testing, Stability, Damping, Velocity.) (*Attitudes of *Pilots.) (Tests, Experimental data, Tables, Photographs.) (Motion, Equations.)

A visual flight investigation indicates the extent to which cross coupling affects handling qualities as a function of engine angular momentum, angular velocity about the yaw axis, and longitudinal control power. A theoretical examination, supplemented by simulator data, indicates the extent to which increased longitudinal damping improves the coupling controllability.

AD-265 915 Div. 1, 9
(TIPTA/WAW) OTS price $1.75

National Aeronautics and Space Administration, Washington, D. C.
AERODYNAMIC CHARACTERISTICS OF A CANARD AND AN OUTBOARD-TAIL AIRPLANE MODEL AT HIGH SUBSONIC SPEEDS,
by Paul G. Fournier. Nov 61, 67p. incl. illus. (NASA Technical note no. D-1002)
Unclassified report

Also available from NASA, Wash. 25, D. C., as NASA Technical note D-1002.

DESCRIPTORS: (*Wing-body configurations, *Canard configuration, Stability (Lateral) stability (Longitudinal), Stability, Aerodynamics, *Transonics, Control, Lift, Drag, Moments, *Airplanes.) (Tails, Fins, Stabilizers (Horizontal tail surface), Effectiveness.)

An investigation was made in the Langley high-speed 7- by 10-foot tunnel through a range of Mach numbers from 0.60 to 0.95 of the static longitudinal and lateral stability and control characteristics of a canard airplane configuration and an outboard-tail configuration. The canard model had a twisted wing with approximately 67 degrees of sweepback and an aspect ratio of 2.91 and was tested with three trapezoidal canard surfaces having ratios of exposed area to wing area of 0.032, 0.076, and 0.121. The canard model had a single body-mounted vertical tail. The outboard-tail model had its horizontal- and vertical-tail surfaces mounted on slender bodies attached to the wing tips and located to the rear and outboard of the 67 degrees sweptback wing of aspect ratio 1.00. The data, which are presented with limited analysis, provide information at high subsonic speeds on these two types of high-speed airplanes which have previously been tested at supersonic speeds and reported in NACA RM L58B07 and NACA RM L58E20 (AD-153 929 and AD-221 852). (Author)

AD-265 916 Div. 1, 9
(TIPTP/JW) OTS price $.75

National Aeronautics and Space Administration, Washington, D. C.
ANALYSIS OF A PILOT-AIRPLANE LATERAL INSTABILITY EXPERIENCED WITH THE X-15 AIRPLANE,
by Lawrence W. Taylor, Jr. Nov 61, 29p. incl. illus. tables (NASA Technical note no. D-1059)
Unclassified report

Also available from NASA, Wash. 25, D. C., as NASA Technical note D-1059.

DESCRIPTORS: (Stabilization systems, *Flight simulators.) (Control systems, Human engineering, Rocket planes, *Stability (Lateral).) (Aerodynamics, Hypervelocity vehicles.)

An analysis is made of a lateral-control problem in which the pilot, through normal application of control, induces divergent oscillations

in bank angle. The problem, first encountered in the X-15 simulator and later confirmed in flight, is explained through the use of root-locus plots of the pilot-airplane combination in which the pilot is represented by a human transfer function. A parameter is developed which is useful for predicting the lateral-control problem and for showing the effect of the principal aerodynamic and inertial parameters. Also, means of determining regions in the flight envelope where the pilot-airplane would be susceptible to lateral instability are developed. The calculated lateral-control limits agree with the simulator- and flight-determined limits for the X-15 airplane. (Author)

AD-266 026 Div. 1
(TIPTA/DLW) OTS price $1.60

General Dynamics/Convair, San Diego, Calif.
AIRCRAFT BRAKES ENERGY TO BURN,
by W. Nugent. 1961, 13p. incl. illus. tables.
Unclassified report

DESCRIPTORS: (*Landing gear, Airplanes, *Friction brakes, Heat of fusion, *Heat transfer, Cooling, Nose wheels, Load distribution, Torque, Kinetic theory, Design, Mathematical analysis.)

The wheel braking force is usually expressed as brake torque. It is a function of the airplane rolling speed, the weight which is distributed to the wheels, and the apparent coefficient of friction between the tire and runway surface. The load reaction at the wheels is a function of the wing lift which, due to the airplane altitude, may markedly increase or decrease the load distributed on the wheels. A numerical example is presented which is concerned with dissipating the heat generated by frictional resistance to motion. Distributing this energy between eight wheel brakes requires that a heat reservoir with a capacity of seven million foot pounds of kinetic energy be provided for each brake. The thermal capacity of the brake is determined using 80 lbs of steel as the heat sink. (Author)

2. ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-265 588 Div. 2, 30
(TIPTW/JRG) OTS price $2.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
A ROCKET BORNE SUNFOLLOWER,
by William M. Frey. Aug 61, 24p. incl. illus.
(BRL Memo. rept. no. 1364)
(Proj. no. 503-06-011)
Unclassified report

DESCRIPTORS: (*Photoelectric target seekers, Sun, *Sounding rockets, Instrumentation, Design, Tests.) (Booster rockets, Effectiveness.) (Upper atmosphere, Atmospheric sounding, Water vapor, Measurement, Meteorological instruments.)

The design and development of the BRL Sunfollower Model II are described. The system was developed for use in a comparatively inexpensive rocket (Nike-Cajun) for gathering upper atmosphere data, specifically on water vapor content. The instrument is powered by a null seeking dc servo system which drives a light-weight mirror. It is capable of acquiring its target, the sun, and locking on at spin rates approaching 1000 rpm. Optimum accuracy is + or - 0.5 degrees at approximately 600 rpm. It is pointed out that below burnout height, target acquisition might not be reliable since the device's centrifugal switch might not perform properly during a high g loading. The instrument could be adapted to track any reasonably bright light source by making small modifications, principally of the sensor holders and masks.

AD-265 723 Div. 2, 6
(TIPTP/MFA) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
THE PROBLEM OF THE EFFECT OF VARIATIONS IN THE INTENSITY OF COSMIC NOISES ON THE DIURNAL DISTRIBUTION OF THE NUMBER OF METEOR REFLECTIONS,
by L. P. Serafinovich. 13 Oct 61, 4p. incl. illus. (Trans. no. MCL-1322 of Byulleten' Instituta Astrofiziki Akademii Nauk Tadzhikskaya SSR 27:37-39, 1959)
Unclassified report

DESCRIPTORS: (*Extraterrestrial radio waves, Cosmic ray bursts, *Noise, Diurnal variations, Meteors, Radar reflections, Radio receivers.) (Translations, USSR.)

Shain and Kerr (Atm. Terr. Phys., 1955, 6, No. 5, 280-281) explain the midday maximum of meteor reflections. They turn attention to the effect of the diurnal variation in the intensity of cosmic noises on the sensitivity of the receiving apparatus in the frequency range below 100 Mc. The sensitivity of the apparatus, in turn, affects the number of reflections from meteors. Shain and Kerr point out that the intensity of cosmic noises at 05 - 06 hours on a frequency of 18.3 Mc is by a factor of ten greater than at noon. Taking as the starting level of cosmic noises the level at 05 - 06 hours, they introduce corrections for noise into the mean number of meteor reflections per minute. (Author)

AD-265 739 Div. 2
(TIPTP/WH) OTS price $1.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
THE WATER CONTENT AND TURBULENCE OF STRATIFORM CLOUDS IN THE ARCTIC,
by A. I. Voskresenskiy and L. T. Matveyev.
19 Oct 61, 10p. incl. illus. tables (Trans. no. MCL-1400 of Meteorologiya i Gidrologiya 11:14-19, 1960)
Unclassified report

DESCRIPTORS: (*Humidity, *Moisture, Turbulence, Stratus clouds, *Arctic regions.) (Translations, USSR, Experimental data.)

An analysis is presented of the experimental data on the water content and turbulent regime of stratiform clouds in the Arctic. Most observations were made in July-September, over ice-free regions of the Kara, Laptev, and East Siberian Seas. (Author)

AD-265 756 Div. 2
(TIPTP/MFA) OTS price $6.60

Harvard Coll. Observatory, Cambridge, Mass.
CLASSIFICATION OF SOLAR PROMINENCES. XII. SUMMARY FOR 1944 TO 1954,
by Donald H. Menzel and F. Shirley Jones. Oct 61, 59p. incl. illus. tables (Scientific rept. no. 12)
(Contract AF 19(604)4962)
(AFCRL-882)

Unclassified report

DESCRIPTORS: (*Solar flares, *Classification, Solar corona, Measurements, Astronomical data, Tables.) (Sunspots, Astronomical observatories, Motion picture film.)

The areas and behavior classifications of the prominences on the sun during solar cycle no. 18 are summarized, and a study is presented of the distribution of the various classes with respect to solar latitude. For all classes combined and for each, except the spicules, separately, activity reached a maximum near spot maximum in 1947 and a minimum nearly two years before spot minimum in 1954. During this solar cycle, 93% of the prominences were of A types in which the material descended from the corona, and 20% were of S types, associated with sunspots. The biggest class of prominences was the AN or hedgerow family; the smallest, the BN's or spicules. The overall trend in the prominence areas was thus due mainly to the AN prominences. Ratios of prominence areas to spot areas decreased from 1944 to 1947 and increased rapidly in 1953 and 1954. (Author)

AD-265 792 Div. 2
(TIPTP/GW) OTS price $7.60

Chicago U., Ill.
MESOMETEOROLOGICAL STUDY OF SELECTED AREAS IN THE UNITED STATES.
Final rept., 1 Apr 59-31 Aug 61,
by Henry A. Brown and Joseph L. Goldman.
31 Aug 61, 27p. illus.
(Contract DA 36-039-sc-78901, Proj. 3A99-07-001-04-01)

Unclassified report

DESCRIPTORS: (*Weather forecasting, Meteorological data, Climatic factors.) (*Wind, Meteorological charts, Mountains, Fluid mechanics, Arizona.) (*Air mass analysis, Meteorological charts, Texas, Oklahoma, *Storms, Precipitation.)

Horizontal Structure of Mountain Winds; During December 20-26, 1960, a mesometeorological field operation was conducted in the area of Fort Huachuca, Arizona. Major purposes of the operation were to study mesoscale atmospheric circulations during relatively undisturbed conditions and to detect local features important in the genesis or development of mesosystems. Analyses, utilizing rawinsonde data, 16-mm time-lapse motion pictures, and surface network data, revealed the existence and periodic occurrence of a mesoscale mountain (downslope) wind which exhibited most of the horizontal characteristics of a cold front. Composite charts illustrate the horizontal structure and motion of the system. An Investigation of Developmental Processes of the Wake Depression Through Excess Pressure, Analysis of Nocturnal Showers; A normalization technique by which the material change of excess pressure in a mesosystem can be computed graphically is devised and used in a case study of a system which originated and developed totally within another mesoscale system. Resulting patterns, which include excess pressure production rate and wake production rate, comply with implications from Fujita's computations. (Author)

AD-265 809 Div. 2, 12, 16
(TIPTB/CCH) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE EARTH AND ITS NEIGHBORS,
by N. Barabashov. 16 Oct 61, 7p. (Trans. no. FTD-TT-61-76 of Pravda Ukrainy 135:pp. 2, 10 June 61)

Unclassified report

DESCRIPTORS: (*Translations, USSR, *Earth and *Space flight.) (*Astronautics and Space navigation.) (Manned, Spaceships.)

AD-265 811 Div. 2, 12
(TIPTB/CCH) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CONQUEST OF COSMIC SPACE,
by G. M. Idlis. 23 Oct 61, 8p. (Trans. no. FTD-TT-61-103 of Kazakh SSR Vestnik Akademii Nauk Kazakhskoy SSR 5:10-14, 1961)

Unclassified report

DESCRIPTORS: (*Translations, USSR, *Space flight, Scientific research.)

AD-265 837 Div. 2, 30
(TIPTP/GW) OTS price $10.50

Army Electronic Proving Ground, Fort Huachuca, Ariz.
STANDARD INSTALLATION MANUAL FOR SIGNAL CORPS METEOROLOGICAL TEAMS,
Aug 61, 130p. incl. illus. (Technical memo. 70-18)

Unclassified report

DESCRIPTORS: (Installation, Standards of *Meteorological instruments for Weather stations.) (*Instruction manuals on Calibration, Maintenance.)

A manual was prepared as a guide for standard installation and station-level maintenance, and as a ready reference of general information on standard and nonstandard meteorological equipment. It provides basic guidance to field and department personnel for installation of all types of equipment authorized by the department's Table of Allowances (TA's) in conformity with sound, tested engineering practices. (Author)

AD-265 849 Div. 2, 6, 8, 12
(TIPTP/MFA) OTS price $4.60

Diamond Ordnance Fuze Labs., Washington, D. C.
INVESTIGATION OF SATELLITE-RELATED IONOSPHERIC ANOMALIES.
Rept. for Jan-June 61,
by Frank Vrataric. Oct 61, 49p. incl. illus.
44 refs. (DOFL rept. no. PR-61-10)
(DOFL Proj. no. 14711)
Unclassified report

DESCRIPTORS: (*Ionosphere, *Satellite vehicles, *Ionization, Clouds, District of Columbia, Detection, Radar reflections, Radar echo areas, Radar signals, Ionospheric disturbances.) (Instrumentation, Photographs, Laboratory equipment, Experimental data, Recording devices.) *Bibliography. (Wave transmission, Satellite attitude.)

An investigation of satellite-related ionospheric anomalies has been conducted. Monitoring results of CW reflected waves and a back-scatter radar are discussed with a review of similar xperiments and related reports. Results of this investigation indicate that anomalies occur too frequently to enable the detection of satellite ionization effects with any degree of confidence. A bibliography of related works is included and a method of obtaining transmission signatures is described. (Author)

AD-265 991 Div. 2
(TIPTP/MFA) OTS price $4.60

Woods Hole Oceanographic Institution, Mass.
CURRENT STUDIES OFF PLANTAGENET BANK,
by John G. Bruce. June 61, 9p. illus. tables.
(Ref. no. 61-17; Hudson Labs., Columbia U., ARTEMIS rept. no. 17)
(Contract Nonr-286600; In cooperation with Hudson Labs., Columbia U., Dobbs Ferry, N. Y., Contract Nonr-26666)
Unclassified report

DESCRIPTORS: (*Oceanography, *Ocean currents, Oceanographic vessels, Ocean bottom, *Oceanographical charts, Measurement, Bermuda, Velocity, Buoys, Markers.) Underwater cameras (Experimental data, Photographs, Tables.)

A series of current measurements were made southwest of Plantagenet Bank, Bermuda from October 5-18, 1959, at various depths ranging from 5 fathoms to the bottom in water depths of from 40 to over 100 fathoms. With the exception of the bottom measurements which were made with a camera type current meter, all the current measurements were made with parachute drogues. The magnitude of the currents ranged from 1 knot at 5 fathoms to less than 0.02 knot just off the bottom and the direction of flow was generally southeast. The somewhat erratic behavior in the movement of the drogues just south of the bank seemed to indicate turbulent flow in this region. The currents do not seem to be tidal in nature, but during the period of measurement flowed fairly consistently in one direction, perhaps indicating association with the Gulf Stream. (Author)

AD-266 022 Div. 2, 15
(TIPTP/MFA) OTS price $1.60

General Dynamics/Convair, San Diego, Calif.
USING THE EARTH'S UMBRA TO MAINTAIN ORBITAL PERIOD.
Engineering research rept.,
by J. F. Farrell. 28 Sep 61, 12p. incl. illus.
(Rept. no. ERR-SD-143)
Unclassified report

DESCRIPTORS: (Earth, *Orbital flight paths, Satellites, *Satellite vehicles, Errors, Drift.) (Equations, Partial differential equations, Data.)

A method is described whereby the umbra of the earth may be utilized to obtain an on-board indication of the orbital period of a satellite. It is found that, for certain angles of inclination, the shadow of the earth provides an accurate timing mechanism and that, by measuring orbital passages through a period of several revolutions, qualitative information regarding orbital elements can be developed within the satellite. Optimum results are obtained when the orbital plane lies in the ecliptic plane; however, certain other orbital inclinations can be tolerated. Oblateness of the earth is considered and found to be of no consequence. (Author)

AD-266 037 Div. 2, 6
(TIPTP/WH) OTS price $1.60

Illinois State Water Survey, Urbana.
STUDY ON INTENSITY OF SURFACE PRECIPITATION USING RADAR INSTRUMENTATION.
Quarterly technical rept. no. 13, 1 Apr-30 June 61,
by R. M. Johnson, E. A. Mueller, and G. E. Stout.
30 June 61, 15p.
(Contract DA 36-039-sc-75055)
Unclassified report

DESCRIPTORS: (*Meteorological radar, Precipitation, Surfaces, Intensity, *Raindrops, Radioactive fall-out.) (Meteorology, Cameras.)

The utility of radar in measuring surface precipitation is studied. Radar techniques in measuring precipitation are to be improved for application to radioactive rainout prediction, trafficability, and communications. Effort was directed to determining the correlation between radar variables and actual rainfall quantities by means of raindrop-size distribution. (Author)

AD-266 041 Div. 2, 25
(TIPTP/MFA) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
MATTER BETWEEN THE EARTH AND SUN,
by W. Krzeminski. 28 Aug 61, 3p. (Trans. no. MCL-1219 of Postepy Astronomii 8:169-170, 1960)
Unclassified report

DESCRIPTORS: (Translations, USSR.) (Astronomical observatories, *Interstellar matter, *Solar corona, Earth, Sun, Zodiacal light, Solar eclipse, Sky brightness, Van Allen radiation belt, Gases, Particles, Atmosphere.) (Instrumentation, Spectrographic data, Spectrographic cameras.)

Data on interplanetary gas and dust components were determined. In view of the difficulties of polarization measurements, spectroscopic methods were used. The spectrograph was attached to a Schmidt f/0.8 camera located more than 5000 m high in the Andes. The measurements

showed that the electron-gas density in the neighborhood of the Earth's orbit is lower than has been supposed so far and is, in fact, 150 electrons per cc. It was also found that the intensity of the zodiacal light is correlated with the eruptions on the sun. (Author)

AD-266 079 Div. 2, 15
(TIPTB/CW) OTS price $1.60

California U., Berkeley.
UNBIASED ESTIMATION BASED ON TRANSFORMED VARIABLES, WITH PARTICULAR REFERENCE TO CLOUD SEEDING EXPERIMENTS,
by Jerzy Neyman and Elizabeth L. Scott. 1960, 18p. incl. illus.
(Contract DA 04-200-ORD-171, T. O. 3)
(OORR 60-2) Unclassified report

Proceedings of the Fifth Conference on the Design of Experiments in Army Research Developments and Testing.

DESCRIPTORS: (Meteorology, *Clouds, *Artificial precipitation, *Meteorological data, Mathematical analysis, *Transformations (Mathematics).)

The purpose of the present paper is to provide formulas for the unbiased estimation of parameters in their natural units when the analysis is based on transformed variables. While we are primarily concerned with the evaluation of cloud seeding experiments, and, more specifically, with unbiased estimation of the effects of seeding, the same formulas are likely to be useful in other cases. (Author)

3. CHEMICAL WARFARE EQUIPMENT AND MATERIALS

No Entries

4. CHEMISTRY

AD-265 508 Div. 4, 7
(TIPTM/TCG) OTS price $1.10

TYCO, Inc., Waltham, Mass.
ELECTROCHEMISTRY OF FUEL CELL ELECTRODES.
Quarterly letter rept. no. 1.
10 July 61, 3p. incl. illus.
(Contract NObs-84770)
(ARPA order no. 204-61)
Unclassified report

DESCRIPTORS: (Electrochemistry, *Fuel cells, *Electrodes, Preparation, Catalysis of Surfaces with Chemical properties, Crystal structure.) (Synthesis of Nickel alloys and Iron alloys of Arsenides and Tellurium alloys, *Intermetallic compounds, Castings.) (Polarization, Wet cells, Design, Tests for Hydrogen ion concentration.)

Correlation of the catalytic activity of electrode surfaces with electronic properties is being studied. Identification and preparation of electrode polarization is being carried out. A literature survey of representative crystal-structure type compounds has been made with initial synthesis efforts on selected compounds. A sound ingot of NiAs was prepared, but NiTe and FeAs preparations were inhomogenious. A polarization cell was made containing electrodes prepared by wax mounting ingots in glass tubes and face grinding to desired electrode geometry. Preliminary experiments were performed with platinized-Pt, H2, 0.1 N H2SO4 half-cells to determine equipment characteristics.

AD-265 528 Div. 4
(TIPTM/SEB) OTS price $1.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
THE THERMODYNAMIC PROPERTIES OF NITROTRICHLOROMETHANE,
by Alexander H. Castelli and Frank Pristera.
Sep 61, 13p. incl. illus. tables (Rept. no. FRL-TN-91)
(Dept. of the Army, Proj. no. 5B99-25-001)
Unclassified report

DESCRIPTORS: (*Methane, Chlorides, Nitro radicals.) (Chemical bonds, Vibration, Nuclear reasonance, Enthalpy, Specific heat, Entropy, Thermodynamics, Electron diffraction analysis, Theory, Mathematical analysis.

From measurements of its vibrational spectrum and electron diffraction, the heat capacity, enthalpy, free energy and entropy of nitrotrichloromethane as an ideal gas have been calculated at a pressure of one atm. and for one hundred degree intervals over the range 200 to 700 K. The calculation was based on a rigid rotator, simple harmonic oscillator model. Motion of the symmetric top about the carbon nitrogen axis adds a free internal rotation contribution to the thermodynamic properties. (Author)

AD-265 531 Div. 4
(TIPTM/EJH) OTS price $3.60

Feltman Research Labs., Picatinny Arsenal, Dover N. J.
RELATION BETWEEN VISCOSITY AND MOLECULAR WEIGHT FOR AN ISOTACTIC POLYBUTENE-1,
by Richard J. Valles, Salvatore S. Stivala, and David W. Levi, Nov 61, 41p. incl illus. tables.
(Technical rept. no. FRL-TR-50)
(DA proj. 599-01-004)
Unclassified report

DESCRIPTORS: (*Polymers, *Butenes, *Molecular weight, *Viscosity, Organic solvents.) (Fractionation, Melting, Light, Scattering, Temperature, Heptanes, Naphthalenes, Test equipment, Test methods.)

An isotactic polybutene-1 was fractionated and melting points of several of the fractions were determined. Light scattering and viscosity studies of the fractions were carried out. The molecular weight range investigated was 0.45 x 10 to the 5th power to 0.9 x 10 to the 6th power. (Author)

AD-265 593 Div. 4
(TIPTP/MFA) OTS price $1.60

Brandeis U., Waltham, Mass.
INTRAANNULAR RESONANCE EFFECTS IN FERROCENE.
Final technical rept., 1 June 59-30 June 61,
by Myron Rosenblum. 30 June 61, 11p. incl. illus.
(Contract DA 19-020-ORD-4757, Proj. TB2-0001)
(AROD rept. no. 2258:1)
Unclassified report

DESCRIPTORS: (Organic compounds, Benzyl radicals, *Ferrocenes, Chemical reactions, Chemical analysis, Experimental data, Ultraviolet research, *Resonance absorption.) Tables.

A tabular summary is presented for the synthesis of the arylferrocenes, the acetylation studies of mono- and diarylferrocenes along with the results of competition experiments and the ultraviolet absorption spectral data for these compounds.

AD-265 724 Div. 4
(TIPTM/EJH) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
THE PROBLEM OF THE MECHANISM OF BALLOELECTRIC PHENOMENA,
by G. L. Natanson. 23 Oct 61, 9p. incl. illus. table (Trans. no. MCL-1326 of Doklady Akademii Nauk, SSR 73:975-978, 1950)
Unclassified report

DESCRIPTORS: (Liquids, *Atomization, *Fog, *Aerosols, *Sprays, *Drops, Electrical effects, Electrical properties, Theory.) *Electrolytes, Solutions, Inorganic substances, Organic compounds, Dissociation, Ions, Additives, Electric potential. USSR, Technological intelligence, Translations.

AD-265 797 Div. 4, 17, 14
(TIPTM/BRW) OTS price $1.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
INTERMEDIATE STAGES OF REACTIONS FORMING CARBIDES OF TITANIUM, ZIRCONIUM, VANADIUM, NIOBIUM, AND TANTALIUM,
by G. V. Samsonov. 29 Sep 61, 18p. incl. illus. tables, 24 refs. (Trans. MCL-1425 of Obshchaya Neorganicheskaya i Fizicheskaya Khimiya, pp. 287-296)
Unclassified report

DESCRIPTORS: (Preparation, *Carbides, Titanium compounds, Zirconium compounds, Vanadium compounds, Niobium compounds, Tantalum compounds, Oxides, Chemical reactions, Heat of reaction.) (Carbon compounds, Monoxides, Reduction.) Vacuum furnaces.

Tensimetric examination was made of the formation of the carbides TiC, ZrC, VC, NbC and TaC in a vacuum. During x-ray and chemical analysis of intermediate and final products, and also during the calculation of approximate heat values of their formation, the passage of the reaction is confirmed for obtaining TiC, and ZrC through the stage of intermediate oxides Ti_2O_3, Ti_3O_5, TiO and Zr_2O_3, ZrO, respectively and also for the reaction of forming carbides of V (from V_2O_3 + 5C), of Nb and Ta (from Nb_2O_5 + 7C and Ta_2O_5 + 7C) through the stage of intermediate oxides VO, V_4O and TaO_2, Ta_4O. The presence of intermediate oxides of Zr, Zr_2O_3 and ZrO, and similar corresponding oxides Ti_2O_3 and TiO is indicated, and it was established that ZrO has a cubic face-centered lattice with period a equal 4.62 Angstrom. The conditions for obtaining NbC and TaC in a vacuum were made more precise. (Author)

AD-265 819 Div. 4, 30
(TIPTM/GEC) OTS price $7.60

Air Force Cambridge Research Labs., Bedford, Mass.
CLASSICAL PURIFICATION TECHNIQUES,
by A. F. Armington, J. K. Kennedy and others.
Feb 61, 72p. incl. illus. tables, 152 refs.
(Rept. no. AFCRL-1)
Unclassified report

DESCRIPTORS: (Chemistry, *Purification, Theory, Test methods, Separation, *Crystallization, *Solvent extraction, *Zone melting, *Fractionation, *Sublimation.) Electronics. (Purification by Synthesis and Decomposition.) (*Bibliography, Purification.)

For certain electronic applications, a purity level in materials is demanded far exceeding that needed for the usual application of these materials. While most emphasis has been placed on ultrapure materials for electronic usage, high purity can also produce desirable properties from both the physical and chemical viewpoints. The techniques discussed are generally physical techniques in which purification is achieved by a difference in physical properties of the matrix material and its impurities. The techniques usually involve a phase change in order to achieve purification. In contrast, the Van Arkel process might be considered a chemical purification technique, since purification is achieved in part by the formation and decomposition of a chemical compound. (Author)

AD-265 956 Div. 4
(TIPTM/TCG) OTS price $1.60

Aerojet-General Corp., Azusa, Calif.
RADICAL FORMATION AND TRAPPING IN TRITIUM-ENRICHED ICE,
by John M. Flournoy, Seymour Siegel, and Henry S. Judeikis. Sep 61, 6p. illus. (Rept. no. TN-41)
(Contract AF 18(603)110, Proj. 9750)
(AFOSR-1481) Unclassified report

Presented at the Fifth International Symposium on Free Radicals at Uppsala, Sweden, 6-7 July, 1961.

DESCRIPTORS: *Ice with *Tritium, Labeled substances, Gamma rays, Production and Numerical analysis of Hydroxides, Electrons, Paramagnetic resonance, Molecular spectroscopy, Chemical reactions, Energy, Determination, Radioactive isotopes, Thermodynamics.

Electron-paramagnetic-resonance (EPR) spectrometry was used to follow quantitatively the formation of trapped OH radicals at 77 K in a sample of ice containing 1 curie/ml of tritium-labeled water as a source of internal beta-radiation. The results are compared with the results of studies of gamma-irradiated ice. The absolute value of the rate constant at look, activation energy for the process, and 3/2-order rate expression were the same as those for gamma-produced irradiated ice. (Author)

AD-265 962 Div. 4, 30, 6
(TIPTW/DLW) OTS price $2.60

Army Engineer Research and Development Labs., Fort Belvoir, Va.
THE DETECTION AND MEASUREMENT OF TRACE HYDROCARBON IN COMPRESSED GASES. THE INFRARED ANALYZER AND THE HYDROGEN FLAME IONIZATION ANALYZER,
by Donald T. Acheson. 3 Oct 61, 26p. incl. illus.
Unclassified report

DESCRIPTORS: (*Hydrocarbons, Detection, Instrumentation, Test equipment, Measurement, Military requirements.) (*Compressed air, Hydrogen, Flames, Gases, Analysis, Gas ionization, Effectiveness.) (Compressed air, *Infrared gas analyzers, Infrared equipment, Effectiveness.)

Two non-dispersive infrared analyzers and four hydrogen flame ionization hydrocarbon analyzers were tested and evaluated to determine characteristics most suitable for a military, field type hydrocarbon analyzer capable of detecting and measuring in the range of 0 to 3.0 parts per million by weight total hydrocarbons. As a result of this investigation, the hydrogen flame ionization analyzer was determined to be the more suitable for Army missile systems. (Author)

AD-266 027 Div. 4, 25
(TIPTM/EJH) OTS price $2.60

General Dynamics/Convair, San Diego, Calif.
CATALYSIS OF OXYGEN AND NITROGEN ATOM RECOMBINATION.
Rept. on Thermodynamics Investigation.
Oct 61, 19p. incl. illus. (Rept. no. GDC-61-13)
Unclassified report

DESCRIPTORS: *Hypersonic wind tunnels, Wind tunnels, *Recombination reactions, Gases, Nitrogen, Oxygen, Atoms, *Catalysis, Catalysts, Gas flow, Chemical reactions, Reaction kinetics, Test methods, Test equipment, Theory.

There is evidence that very potent O and N atom recombination catalysts can be developed. Very little research has been directed toward this objective, as a review of the literature reveals. The proposed investigation is intended to experimentally identify gas phase catalysts for O and N atom recombination and theoretically evaluate their effect on the chemical lag of the test gas flowing through a hypersonic wind tunnel facility. (Author)

AD-266 052 Div. 4, 14, 25
(TIPTM/GEC) OTS price $1.60

Manchester Coll. of Science and Tech. (Gt. Brit.).
CROSS LINKING OF LINEAR POLYMERS BY CONDENSATION REACTIONS.
Annual rept. no. 2, 1 Oct 60-30 Sep 61.
30 Sep 61, 9p. illus.
(Contract DA 91-591-EUC-1516; Continuation of Contract DA 91-591-EUC-1034)
Unclassified report

DESCRIPTORS: (*Polymers, Styrenes with Glycols, *Polymerization, *Copolymerization, Chemical bonds by *Condensation reactions, Chemical reactions, Synthesis.) (Catalysts, Sulfonic acids, Gels.)

The study of cross-linking linear polymers by condensation reactions was continued. P-toluene sulfonic acid was the esterification catalyst in the cross linkage of the copolymers of styrene and methacrylic acid. The theory that a fraction of the cross links formed at gelatin was lost intramolecularly accounted for the wasted links. The results indicated that the condensation reaction was acceptable if the rate constant of the reaction was known accurately. The defects of the chosen reaction were: (1) the speed of reaction was too slow, (2) analytical procedures were not sufficiently accurate to give a reliable of the constant, and (3) the experimentally determined gel-point was not necessarily the theoretical gel-point.

AD-266 095 Div. 4
(TIPTM/EJH) OTS price $1.60

Frick Chemical Lab., Princeton U., N. J.
VISCOELASTIC PROPERTIES OF S - Se - AS COPOLYMERS.
by A. V. Tobolsky, G. D. T. Owen, and A. Eisenberg. 13 Oct 61, 9p. table (Technical rept. no. RLT-38)
(Contract Nonr-185807, Proj. NR 356-377)
Unclassified report

DESCRIPTORS: (*Arsenides and *Selenium compounds, *Sulfur compounds, *Arsenic compounds, *Polymers, Polymerization, *Copolymerization, Transition temperature, Viscosity, *Elasticity, Tensile properties, Mechanical properties, Temperature, Relaxation time.) Molecular structure.

The purpose of this work was to study the glass transition temperature, Young's modulus as a function of temperature, and the stress relaxation of the binary system S-As (varying the As content from 8 to 40%); and the ternary system Se-S-As (in which the As content was kept constant at 8 mole % and the Se:S ratio varied). (Author)

5. COMMUNICATIONS

AD-265 554 Div. 5, 15
(TIPTP/MFA) OTS price $8.10

Institute of Science and Tech., U. of Michigan, Ann Arbor.
OPTIMIZATION OF SOME NOISY NONLINEAR SYSTEMS.

Doctoral thesis,
by Robert O. Harger. Oct 61, 82p. incl. illus. 23 refs. (Rept. no. 2900-290-T)
(Contract DA 36-039-sc-78801, Proj. Michigan)
Unclassified report

DESCRIPTORS: (*Noise, *Nonlinear systems, Signals, Transmission, Communication systems, Signal-to-noise ratio.) (Instrumentation, Detectors, Half-wave rectifiers, Band-pass filters.) (Transformations (Mathematics), Integral transforms, Bessel functions, Real variables.)

The presence of noisy nonlinearities in the transmission of signals in a system whose function is either signal recovery (estimation) or signal detection is considered. The system is composed of a nonlinear operator followed inseparably by an additive stochastic noise source and interspersed between two linear time-invariant filters. For the estimation function, two types of signal are considered: a sinusoidal signal of random phase; and a more general stochastic signal of second-order stationarity. For the sinusoidal case, it is shown that infinite prefilter gain is optimum for v-th-law and error function type devices, while for the stochastic case, specification of the optimum postfilter is derived with the same result for prefilter gain. For the detection function, a narrowband signal of known form is assumed. The postfilter gain is determined by matched-filter theory, and it is shown that prefilter gain should be infinite, though the conditions are relatively restrictive for the results. (Author)

AD-265 663 Div. 5
(TIPTE/CRJ) OTS price $1.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
COMPARISON OF TWO METHODS OF UTILIZATION OF ONE-DIMENSIONAL COMMUNICATION STATISTICS TO IMPROVE FREEDOM FROM NOISE,
by Yu. N. Mel'nikov. 24 Aug 61, 19p. incl. illus. tables, 11 refs. (Trans. no. MCL-983 of Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, Energetika i Avtomatika 5:116-123, 1960)
Unclassified report

DESCRIPTORS: (*Communications theory, *Radio communication systems, Radio transmission, Coding, Errors, Signal-to-noise ratio, Statistical analysis.) (*Noise (Radio), Reduction.) USSR.

One of the most topical problems of radioengineering and communications theory is the improvement of the freedom from noise of transmissions. The redundancy in practically every communication transmitted does not always optimally improve freedom from noise. In order to utilize the redundancy defined by a 1-dimensional communication statistics to improve the freedom from noise, two different methods are described. (Author)

AD-265 713 Div. 5, 6, 30
(TIPTE/RD) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
A DEVICE FOR CONVERTING AN ANGLE OF ROTATION INTO A COMPLETE CODE WITH STATIC MAGNETIC PICKUP,
by M. G. Geshelin, A. G. Namikonov, and B. N. Levin. 3 Oct 61, 2p. incl. illus. (Trans. no. MCL-1307 from Byulleten' Izobreteniy 9, 1960)
Unclassified report

DESCRIPTORS: (Technological intelligence, USSR, Translations.) (*Data transmission systems, Coding, Digital systems, *Switching circuits.) (Magnetic recording systems, Transducers.) (*Telemeter systems, Reliability.)

A device is described for converting an angle of rotation into a complete code with static magnetic pickup, differing in that, for the purpose of increasing the reliability of teletransmission of data, a code wheel is used, on the outer perimeter of which are located magnetic selection elements, which form a closed magnetic circuit along the generatrix of the wheel for four pickup coils and along the perimeter of the wheel for the fifth, thereby ensuring circular coding with a complete code. (Author)

AD-265 720 Div. 5
(TIPTP/MFA) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
A METHOD OF MULTIPLE PHASE MANIPULATION AND A DEVICE FOR ITS ACCOMPLISHMENT,
by F. K. Sergiyenko. 6 Oct 61, 4p. incl. illus. (Trans. no. MCL-1316 from Byulleten'Izobreteniy 16, 1960)
Unclassified report

DESCRIPTORS: (Communications system, Coding, Oscillation, *Phase modulation, *Telegraph signals, Counting methods, *Pulse counters, Radio receivers.) (Translations, USSR.)

A proposed method of multiple phase manipulation is presented for transmitting telegraphic reports which make it possible to eliminate the ambiguity of the phase upon reception. This is achieved by transmitting with an n-position binary code obtained as a result of adding the preceding code transmission and the binary signal to be transmitted, according to the modulus 2n. A device consisting of a coding section on the transmitting end of the communication system and a decoding section on the receiving end is proposed for carrying out the method described for coding. (Author)

AD-265 722 Div. 5, 30
(TIPTE/RD) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
A METHOD OF TIME-COMPRESSION AND EXPANSION OF CONTINUOUSLY PASSING INFORMATION,
by G. B. Il'yin. 4 Oct 61, 3p. (Trans. no. MCL-1319 from Byulleten' Izobreteniy 17, 1960)
Unclassified report

DESCRIPTORS: (Technological intelligence, USSR, Translations.) (*Data transmission systems, *Data processing systems, Programming.) (Magnetic recording systems, Memory devices, Switching circuits.) (Time signals, Reading machines.)

A method of time-compression and expansion is described of continuously passing information

of telephone type. It is based on rapid reading of slowly recorded information, differing in that, for the purpose of compressing information in portions and eliminating a cumulative time error resulting from asynchronous functioning of the memory material, during compression the passing information is recorded by continuously moving magnetic heads alternately on two stationary circular paths with periodic switching of the recording from the first ring to the second and back again by timing signals, which simultaneously switch the reading and quenching heads, continuously moving at a speed n times greater, correspondingly from the second ring to the first and back again, while during expansion of the compressed information the recording speed is chosen n times greater than the counting and quenching speed. (Author)

AD-265 728 Div. 5, 6, 30
(TIPTE/CRJ) OTS price $1.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
REMARKABLE PROGRESS OF SOVIET RADIO-ELECTRONICS (Pozoruhodny Pokrok Sovetske Radioelektroniky), by Jaroslav Maruna. 15 Sep 61, 11p. (Trans. no. MCL-1337 of Sdelovaci Technika 10:371-372, 1960)
Unclassified report

DESCRIPTORS: (*Radio, *Electronics, *Radio communication systems, Radio broadcasting, *Television, *Television communication systems, Telegraph systems, *Radio relay systems, Radio stations, *Radio equipment, *Radar, Telemeter systems, Radio astronomy, *Computers, *Atomic energy, *Nuclear reactions, USSR.)

Contents:
Radio-communication, broadcasting and TV
Radar and radio telemetering
Electronic computers
Radioelectronics in atomic technology

AD-265 815 Div. 5, 30, 8
(TIPTP/JW) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A WIRE FREQUENCY RESONATOR FOR TELEMETERING, by Yu. I. Pivovarov and Yu. M. Tsodikov. 13 Oct 61, 9p. incl. illus. (Trans. no. FTD-TT-61-122 of Avtomatika i Telemekhanika 21:539-542, 1961)
Unclassified report

DESCRIPTORS: (*Telemeter systems, Resonance, Test equipment, Test methods.) (Telemetering data, Industrial research, Frequency meters.) (Translation, USSR.) (Wire, Vibration, Resonance, *Digital systems, *Transducers.)

The operation of a wire frequency resonator for industrial telemetering is described, and the basic calculation relationships are given. The results of experimental investigation and the circuit of the wire resonator are given. (Author)

AD-265 996 Div. 5, 8
(TIPTE/CRJ) OTS price $15.50

Development Engineering Corp., Washington, D. C.
RELIABLE HIGH-FREQUENCY COMMUNICATIONS. Final rept. 6 Feb 59-31 Jan 61, by B. G. Hagaman, T. L. Simpson and others. 28 June 61, 238p. incl. illus. tables, 20 refs. (Rept. no. 20-F)
(Contract DA 36-039-sc-78279, Proj. 3-99-12-104)
Unclassified report

Original contains color plates; All ASTIA reproductions will be in black and white. Original may be seen in ASTIA Hq.

DESCRIPTORS: (*Radio communication systems, High frequency, *Diversity reception, Design.) (*Antennas, Transmission lines, Waveguides, Antenna horns.) (Antenna radiation patterns, Polarization, Impedance, Mathematical analysis, Measurement.)

The development of a broadband dual-polarized TAHA antenna is described. Design criteria include provisions for a 5:1 bandwidth, moderate isolation between polarizations, and preservation of the interference-rejecting characteristics of the tapered aperture. The multiple probe feed system was found to be the most feasible means of fulfilling the design requirements. Basic design requirements for this system are given. Studies of the effect of ground interference and axial elevation on the vertical plane patterns of the TAHA over ground are reported. Expressions are derived for similar calculations to include finite earth conductivities, reflection coefficient, spherical phase front, and axial orientation of the antenna with respect to ground. Modifications of the La Plata TAHA based on model studies are proposed. Theoretical computations by Ledinegg of the radiation pattern characteristic of the 60 degree TAHA are shown to be in agreement with measured data. (Author)

AD-266 069 Div. 5, 8
(TIPTP/MFA) OTS price $2.60

Naval Research Lab., Washington, D. C.
IDEAL LIMITING. PART I. THE EFFECT OF IDEAL LIMITING ON SIGNALS AND ON NOISE, by S. F. George and J. W. Wood. 2 Oct 61, 22p. incl. illus. tables (NRL rept. no. 5683)
Unclassified report

DESCRIPTORS: (*Limiters, *Signals, *Noise, Nonlinear systems, Clipper circuits, High frequency, Wave analysis, Band pass filters, Attenuation.) (Integral transforms, Integration, Bessel functions.) (Experimental data, Tables.) Analog to digital converters.

The effect of hard clipping or ideal limiting on sine-wave signals and on shaped, Gaussian-noise inputs is considered. For a single sine wave, the limiter reproduces the fundamental frequency and creates odd harmonics of rapidly decreasing relative power. For two sine-wave inputs of equal amplitudes, the limiter generates arrays of beat frequencies centered symmetrically about the two input frequencies and their shifted odd harmonics. If the two inputs are of unequal amplitude, the stronger signal suppresses the weaker. On shaped, wide-band Gaussian noise, the limiter tends to broaden the high-frequency end of the spectrum slightly and to produce a flat, low-frequency, random-noise response. (Author)

AD-266 070 Div. 5, 8
(TIPTP/MFA) OTS price $3.60

Naval Research Lab., Washington, D. C.
IDEAL LIMITING. PART 2. THE OPERATION OF AN IDEAL LIMITER ON SIGNALS IMBEDDED IN NOISE,
by S. F. George and J. W. Wood. 2 Oct 61, 30p. incl. illus. tables (NRL rept. no. 5684)
Unclassified report

DESCRIPTORS: (*Noise, *Signals, *Limiters, Signal-to-noise ratio, Radiofrequency spectrum analyzers.) (Integral transforms, Harmonic analysis, Bessel functions, Computers, Experimental data, Tables.) Analog-to-digital converters.

A study of the operation of an ideal limiter on simple sine-wave signals in additive Gaussian noise is made. The general theory of two signals in noise is worked out first and the results given in terms of an output power spectrum. Then, special cases (e.g., only one signal present, and two signals with various amplitude ratios) are examined to aid in visualizing what spectral changes are taking place. Emphasis is placed on the effect of a limiter on the input signal spectrum, on the input noise spectrum, and on the input-vs-output signal-to-noise ratio. The Narec Computer was used to obtain the results for the two-signal case. (Author)

6. DETECTION

AD-265 561 Div. 6, 12
(TIPTW/DLW) OTS price $.75

Naval Ordnance Lab., Corona, Calif.
DESIGN OBJECTIVES FOR TELEMETRY R-F TRANSMISSION LINKS FOR THE PERIOD 1960 TO 1970.
Revision no. 1,
by T. B. Jackson. 15 Oct 61, 29p. incl. illus. (NAVWEPS rept. no. 7202; Supersedes NAVWEPS rept. no. 7161 and NOLC rept. no. 538, AD-249 937)
Unclassified report

DESCRIPTORS: (*Telemeter systems, Ultra high frequency, Telemetering receivers, Telemetering transmitters, Telemetering antennas, Microwave amplifiers, Preamplifiers, Data transmission systems, Radio equipment, Ground support equipment, Specifications.) Amplifiers, Antennas. (Guided missiles, Test facilities, Instrumentation.)

Performance characteristics, design limitations, and special operational features required in a general-purpose UHF telemetry transmission link are presented. Separate consideration is given to the transmitter, receiver, preamplifier-converter, distribution amplifier, main receiver, and receiving antenna portions of the link. Flexibility of operation and provision for adapting the ground station complex to several basic applications are emphasized. (Author)

AD-265 662 Div. 6
(TIPTW/RD) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
FALSE TARGETS ON RADAR INDICATOR SCREENS,
by L. A. Fomin. 21 Aug 61, 11p. incl. illus. (Trans. no. MCL-982 of Vestnik Protivovozdushnoy Oborony 1:52-56, 1961)
Unclassified report

DESCRIPTORS: (Technological intelligence, USSR, Translations.) (Radar equipment, Plan position indicators, Radar signals, Identification, *Radar interference.) (Antenna radiation patterns, *Radar pulses, *Radar reflections, Mathematical analysis.)

Clear pips similar in shape to target pulses are sometimes observed in the operation of a radar. These may actually be target pulses, but they arrive upon random coincidence of the synchronization of two stations-one zone and an adjacent one. I relate this to the fact that the operator does sometimes find a target at the same azimuth after the observation of such pulses. However, if it is possible to receive a reflected pulse radiated by another station of identical type, can this be employed to increase the range of target detection. (Author)

AD-265 677 Div. 6
(TIPTB/CCH) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
DEVICE FOR AUTOMATICALLY TRACING THE ACTUAL IMAGES OF OBJECTS (Ustroystvo Dlya Avtomaticheskogo Vycherchivaniya Izobrazheniy Predmetov s Natury),
by V. I. Kirsanov. 3 Oct 61, 5p. incl. illus. (Trans. no. MCL-1030 of Byulleten' Izobreteniy 14:pp. 19, 1960)
Unclassified report

DESCRIPTORS: (*Display systems, Television tracking systems, Phototubes, Memory devices, Recording devices, Electronic scanners for *Radar scanning of Radar images.) (Radar transmitters, *Automatic, *Radar tracking.) (USSR, Translations.)

AD-265 729 Div. 6, 30
(TIPTP/TL) OTS price $3.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
BULLETIN OF THE KAZAN UNIVERSITY ASTRONOMICAL OBSERVATORY.
23 Oct 61, 31p. incl. illus. (Trans. no. MCL-1338 of Byulleten' Astronomicheskoy Observatorii Kazan'skogo Universiteta 35:1-23, 1960)
Unclassified report

DESCRIPTORS: (*Astronomical observatories, Radio astronomy, Radar, Radar echo areas, *Radar tracking, *Meteors, Azimuth, *Ionosphere.) (Antennas, Radar antennas, *Antenna radiation patterns, Radar reflections, *Recording devices, Instrumentation.) (Photography, Motion picture film.) (USSR, Translations.)

The Apparatus of the Engel'gardt Astronomical Observatory for Radar Observations of Meteors, by K. V. Kostylev, Yu. A. Pupyshev, and V. V.

Sidorov: The article describes the recording unit of the KGU-M2 apparatus, which makes it possible to record on motion picture film the basic data on meteor activity, and also the disstribution of radar echoes at three amplitude levels. A Survey of Radar Observations of Meteor Activity, by Yu. A. Pupyshev: A survey is given of systematic radar observations of meteors on the 4.2 meter band at the Engel'gardt Astronomical Observatory from May 1956 through August 1958. A relationship was derived between the duration of the echo and the state of the ionosphere.

AD-265 882 Div. 6, 8
(TIPTE/DLW) OTS price $3.60

Merrimac Research and Development, Inc., Irvington, N. J.
HIGH POWER CIRCULATOR DEVELOPMENT.
Interim development rept. no. 2, 24 July-23 Oct 61.
30 Oct 61, 27p. incl. illus.
(Contract NObsr-85329)
Unclassified report

DESCRIPTORS: (*Transmission lines, S band, Waveguides, *Waveguide couplers, Coupling circuits, Ferrites, Ferromagnetic materials, *Radar duplexers, Radar equipment, Design.) (*Waveguides, Wave transmission, Propagation, Tests.)

The S band circulator was constructed using the principle of small aperture coupling between an unloaded guide and one which is gyromagnetically loaded, to produce a nonreciprocal coupling leading to circulator action. A description is given of the method used to compute the coupler performance. Experimental determinations are described which were made on the ferrite loaded guide and the ferrite material. Results of a preliminary high power test and performance data on an initial breadboard model are included. Research is concerned with the development of design techniques for the construction of very high power circulators. (Author)

AD-265 930 Div. 6, 25
(TIPTE/DLW) OTS price $1.10

Naval Ordnance Lab., Corona, Calif.
A SOLAR-BLIND PHOTODIODE HAVING MAXIMUM SENSITIVITY IN THE MIDDLE ULTRAVIOLET,
by G. G. Kretschmar. 15 Oct 61, 9p. incl. illus.
(NOLC rept. no. 554)
Unclassified report

DESCRIPTORS: (*Phototubes, *Photoelectric cells, *Diodes, *Ultraviolet detectors, Design.) (Diodes, Nickel, Cathodes (Electron tubes), Thin films, Rubidium compounds, Tellurides, Intermetallic compounds, Processing, Vacuum systems, *Manufacturing methods, Production.) (Ultraviolet radiation, Detection, Detectors, Sensitivity.) Electron tubes.

A method is described for the production of photoelectric diodes having maximum sensitivity in the middle ultraviolet. These photodiodes are essentially solar blind. A thin layer of rubidium telluride is formed on the nickel cathode during the evacuation of the tubes. These cathodes showed high quantum efficiency at about 2200 to 2600 Angstroms and little or no sensitivity at wavelengths greater than 3400 Angstroms. (Author)

AD-265 936 Div. 6, 8
(TIPTW/DLW) OTS price $1.10

Naval Ordnance Lab., Corona, Calif.
DELAY VARIATION IN TELEMETRY FILTERS,
by K. L. Berns. 1 Nov 61, 18p. incl. illus. table (Rept. no. NOLC 553)
Unclassified report

DESCRIPTORS: (*Telemeter systems, *Radiofrequency filters, *Delay circuits, Discriminators, Frequency modulation, Design.) (Radio signals, Pulse discriminators, Modulation, Phase distortion, Measurement.)

Advances in telemetry equipment performance give new importance to time delay characteristics of filter networks used in these equipments. The significance of filter delay characteristics in telemetry applications is discussed, and fundamental terms are defined. Suggested methods of delay measurement are presented, and experimental results are given. (Author)

AD-266 012 Div. 6, 8
(TIPTW/CRJ) OTS price $2.60

National Aviation Facilities Experimental Center, Atlantic City, N. J.
PPI PRESENTATION OF TWO UNSYNCHRONIZED TIME-SHARED RADAR INPUTS.
Final rept.,
by Robert L. Sorensen and Lawrence B. Ii. Apr 61, 5p. illus. (Technical development rept. no. 415)
Unclassified report

DESCRIPTORS: (*Plan position indicators, *Display systems, Radar equipment, Design.) (*Radar images, *Radar signals, Video signals, Trigger circuits, Electronic circuits, Display systems, Cathode ray tubes.) *Airport radar systems.

Tests were conducted to determine a method of presenting information from 2 unsynchronized radar inputs having different geographical locations on both a modified AN/SPA-8A and AN/UPA-35 radar plan position indicator. The modified AN/SPA-8A and AN/UPA-35 plan position indicators proved successful in presenting the composite picture of the beacon and ASR-2 radars; however, the time-sharing circuit used in these tests was not optimum for time utilization in displaying radar information. (Author)

AD-266 013 Div. 6, 25
(TIPTE/DLW) OTS price $1.60

Bausch and Lomb Inc., Rochester, N. Y.
INFRARED COATING STUDIES.
Quarterly rept. no. 1, 1 Jan-1 Apr 61,
by R. Walsh and A. F. Turner. Apr 61, 8p. illus.
(Contract DA 44-009-eng-4686)
Unclassified report

DESCRIPTORS: (*Infrared filters, Broadband, Low pass filters, Band pass filters, *Infrared windows, Coatings, *Infrared optical materials, Infrared radiation, Reflection, Wave transmission, Measurement, Design.) (Infrared equipment, Thin films, Vacuum systems, Processing, Preparation.)

Experimental work was directed primarily toward the fabrication of a multilayer filter, complete with auxiliaries, for isolating radiation through

the 8-13 micron atmospheric window. Broad band filters utilizing PbTe and either ZnS or Sb_2S_3 were made and representative transmittance curves of these filters are presented. A low pass filter construction, suitable as an auxiliary for these filters, was determined and experimentally made samples are presented both alone and as a composite with the band pass. (Author)

AD-266 063 Div. 6, 1
(TIPTA/DLW) OTS price $1.10

Naval Ordnance Test Station, China Lake, Calif.
A MEASUREMENT OF PROPELLER-MODULATED RADIATION FROM EIGHT DIFFERENT SMALL AIRCRAFT (U).
by Joseph J. Adler. 21 July 60, 10p. incl. illus. tables (Rept. no. IDP-954)
Unclassified report

DESCRIPTORS: (Airplanes, *Aerial propellers, Propeller turns, *Infrared radiation, Light, Modulation, Sky brightness, Signal-to-noise ratio, Detection, Measurement.) (Radiometers, Infrared detectors, Optical equipment, Harmonic analyzers, Test facilities, Aerial targets, Target recognition, Tests.)

Target-generated signals in the visible and infrared spectral regions were measured for a group of 10 different civilian aircraft. A ground-based, unchopped radiometer system was employed to obtain measurements of the target signals while the aircraft flew prearranged patterns above it. Subsequent analysis of the data yielded signal frequency and harmonic content information. Approximate acquisition ranges were computed from radar and target signal data. It was found that the range at which an airplane may be detected by an unchopped system depends upon the type of background, time of day, type of aircraft and aspect angle. With the equipment used for these tests, the aircraft could easily be detected at ranges of from 10 to 20 thousand feet. (Author)

7. ELECTRICAL EQUIPMENT

AD-265 505 Div. 7, 8
(TIPTE/CRJ) OTS price $15.50

Underwriters' Labs., Inc., New York.
THE INVESTIGATION OF METALLIC RECTIFIERS.
Final engineering rept. 1 Apr-1 June 61.
1 June 61, 235p. incl. illus. tables.
(Contract NObs-77131)
Unclassified report

DESCRIPTORS: (*Selenium rectifiers, *Half-wave rectifiers, Tests, Temperature, Frequency, Resistance.) (Power supplies, Rectifiers.) Tables.

The results are presented of efforts made to analyze the test data and determine the effect of variations in supply voltage, frequency and load on the characteristics of selenium rectifiers. The investigation was limited to testing single-phase, half-wave rectifier stacks having five cells in series and normal spacings between cells. (Author)

AD-265 572 Div. 7, 14
(TIPSW/BRW) OTS price $3.60

Westinghouse Electric Corp., Pittsburgh, Pa.
INORGANIC BINDERS FOR C CORES.
Progress rept. no. 2, 30 June-29 Sep 61,
by J. Seidel. Oct 61, 18p. illus. tables,
10 refs. (Materials Labs. rept. no. 6143-2902)
(Contract NObsr-85304)
Unclassified report

DESCRIPTORS: (*Magnetic cores, *Magnetic materials, Metal films, Steel, Ceramic coatings, Glass, Binders, Thermal expansion.) (Metal films, Nickel plating, Electroplating, Ceramic coatings, Processing.) (Ceramic coatings, Glass, Silicon compounds, Sodium compounds, Titanium compounds, Zirconium compounds, Boron compounds, Lead compounds, Zinc compounds, Rubidium compounds, Aluminum compounds, Barium compounds, Oxides.) Inorganic substances.

Cores were constructed by fusing a 0.0002-in. glassy layer to the surfaces of magnetic steel strips and winding the flexible composite until the required build-up is attained. The viscosity of the glass is adjusted so that during the requisite stress relief anneal of the cores a laminar bond between the adjacent glassy layers is accomplished. A viscosity of approximately 10 to the 8th power poises at 800 C is required. To obtain a core free from residual stresses, the glass is also required to match the thermal expansivity of grain-oriented silicon steel. The problem in obtaining a composition which would have both a high viscosity and a high thermal expansivity is being solved by the synthesis of silicate glasses in the system $R_2O.X\ (RO + R_2O_3 + RO_2).(3-X)\ SiO_2$. Processes for the surface preparation of the magnetic material for binder application have been developed. A suitable slip for binder application was determined. (Author)

AD-265 635 Div. 7, 12, 1
(TIPTM/EJH) OTS price $1.10

Douglas Aircraft Co., Inc., El Segundo, Calif.
FEASIBILITY STUDY AND INVESTIGATION OF THERMOELECTRIC POWER GENERATION AND COOLING FOR FLIGHT VEHICLES.
Interim rept. no. 2, 2 June-1 July 61,
by J. F. Hood. 1 July 61, 7p. (Rept. no. THMR-25-2)
(Contract NOw 61-0404-t)
Unclassified report

DESCRIPTORS: (Guided missiles, Aircraft, *Thermoelectricity, *Electric power production, *Power supplies, Generators, Cooling, Feasibility studies.) (Aircraft, Fighters, Power supplies, Voltage.) (Guided missiles, Power supplies, Electric currents.) (Jet engines, Heat, Sources.) Programming.

The descriptive analysis of the steady state power generating system which forms the basis for the optimization and evaluation computer program is 80% complete. The desirability of incorporating the transient program with the steady state program is being investigated. A study to determine the electrical requirements such as voltage, frequency, and power required by military aircraft and missiles was started. The following is a summary of the information obtained to date. Navy Combat Aircraft: Elec-

trical information was obtained on the A3D, A4D, F4H, F11F, F8U, and F6D aircraft. Power requirements are as follows: Fighter Aircraft 12 - 20 kva, Large Attack Aircraft 30 - 120 kva, Small Attack Aircraft 9 kva. Rocket Powered Missiles: Information was obtained on the Thor, Nike Zeus Skybolt, and Genie. The current required for these missiles varies between 5 and 70 amperes d.c.. (Author)

AD-265 679 Div. 7
(TIPTE/PD) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
A DEVICE FOR AUTOMATICALLY SWITCHING ON AN EXTREMUM ADJUSTER TO PERFORM A SCAN,
by V. V. Kazakevich. 3 Oct 61, 3p. incl. illus. (Trans. no. MCL-1061 of Byulleten' Izobreteniy 9:p. 2, 1960)

Unclassified report

DESCRIPTORS: (Technological intelligence, USSR, Translations.) (*Switching circuits, Automatic, *Electronic switches, *Electronic relays, Control systems.)

A device is described for automatically switching on an extremum adjuster to perform a scan, once the extremum has been reached and the actuating mechanism is stopped, differing in that, in order for the adjuster to track the varying extremum, a guard unit is used for the purpose of receiving the transmitter signal and switching on the actuating mechanism of the adjuster, when the extremum changes by a value exceeding the insensitivity zone. (Author)

AD-265 683 Div. 7
TIPTE/DLW) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
AN ELECTRIC GENERATOR,
by Ye. I. Yantovskiy. 21 Sep 61, 3p. incl. illus. (Trans. no. MCL-1109 of Byulleten' Izobreteniy 8:pp. 16, 1960)

Unclassified report

DESCRIPTORS: (*Generators, Electric power production, Magnetic fields, Combustion chambers, Magnetos, Design.) (Technological intelligence, USSR, Translations.)

An electric generator is described which was made in the form of a synchronous machine. The combustion chamber is located in the air gap of the magnetic system with its operating coil, and with a magneto which is activated by the interaction of its magnetic field with currents excited in the ionized stream of gas in the combustion chamber. The generator differs from those presently in use in that it is a disc type with the active zone at the ends of the stator and the magneto, while the combustion chamber is in the shape of a hollow ring divided into curvilinear sections by spiral baffle plates. (Author)

AD-265 684 Div. 7
(TIPTW/DLW) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
A FRICTION TURBINE,
by S. Ya. Yasinskiy. 3 Oct 61, 2p. incl. illus. (Trans. no. MCL-1110 of Byulleten' Izobreteniy 9:pp. 56, 1960)

Unclassified report

DESCRIPTORS: (Friction, Turbines, Power supplies, *Gas turbines, Gas turbine rotors, Design.) (Technological intelligence, USSR, Translations.)

The familiar friction turbines have low efficiency and great weight and dimensions compared with other types of turbines calculated for the same useful power. A friction turbine is proposed to increase the efficiency and reduce weight dimensions. The effective friction surfaces are formed by deflected bands fixed between 2 discs to assure gas flow along optimum trajectories. Gas is fed to the turbine wheel through tangential channels and moves along the spiral channels formed by the deflected bands. Due to friction of the gas against the effective surfaces formed by the walls of the channels, it releases part of its kinetic energy which is transformed into mechanical work and the gas is exhausted from the turbine wheel. (Author)

AD-265 692 Div. 7
(TIPTE/WAW) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
AN INSTRUMENT FOR MAINTAINING CONSTANT ROTATION SPEED OF AN A-C GENERATOR,
by A. P. Ustinskiy. 3 Oct 61, 3p. incl. illus. (Trans. no. MCL-1227 of Byulleten' Izobreteniy 16:23-24, 1960)

Unclassified report

DESCRIPTORS: (*Generators, Alternating current, Stabilization.) (Stabilization systems, Design, Servo systems.) (USSR, Translations, Technological intelligence.)

The invention described is a device for maintaining the constant rotation speed of an a-c generator, driven by an air turbine, and containing a mechanical differential and an electromagnetic friction brake which operates on it. The braking force is regulated by the speed of the generator. The proposed device differs from previous ones in that one of the axes of its differential is kinematically coupled with the system for controlling the feed of air to the turbine rotor, which makes it possible to increase the efficiency. (Author)

AD-265 721 Div. 7, 8
(TIPTE/RD) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
A COMBINED-VOLTAGE GENERATOR,
by K. K. Knyazyev, N. A. Konstantinov and others. 3 Oct 61, 4p. incl. illus. (Trans. no. MCL-1317 from Byulleten'Izobreteniy 16, 1960)

Unclassified report

DESCRIPTORS: (Technological intelligence, USSR, Translations.) (*Voltage, *Generators, Frequency multipliers, Design.)

The basic patent describes a generator for complex-shape voltage; this generator includes a sine-wave generator, a frequency multiplier, and a summation unit. The proposed generator assures synchronous change of the frequencies of the higher harmonics with a change in the basic frequency, and the reception of signals with given distortions in a wide frequency range. This is achieved by virtue of the fact that it contains, in addition to a generator with fixed tuning, a generator with smooth retuning of the frequency. This generator produces a series of harmonics which are summed with those of the fixed-tuning generator, and also produces voltage whose frequency equals the difference between the fixed and the smoothly-changing frequencies. (Author)

AD-265 763 Div. 7,
(TIPTE/RD) OTS price $9.10

General Electric Co., West Lynn, Mass.
RESEARCH ON LOW TEMPERATURE FUEL CELL SYSTEMS.
Progress rept. no. 17, 15 May-15 Aug 61.
15 Aug 61, 98p. incl. illus. tables, 84 refs.
(Contract DA 44-009-eng-3771)
Unclassified report

Original contains color plates; all ASTIA reproductions will be in black and white. Original may be seen in ASTIA Hq.

DESCRIPTORS: (*Fuel cells, Low temperature research, Design.) (*Electrodes, Oxygen, Polarization, Hydrogen, Irreversible processes, Catalysts.) (Electrolytes, Polymers, Hydrogen ion concentration.) (Electrodes, Surfaces, Platinum, Carbon, Rhodium, Palladium, Gold, Silver.) (Electrolytes, Sodium compounds, Iodic acid, Potassium compounds, Hydroxides, Ammonium radicals, Sulphates, Chlorides, Zinc compounds, Cadmium compounds, Acetates.) Electrochemistry, Catalysis, *Power supplies.

The polarization behavior of the oxygen electrode or hydrogen-oxygen cells on open circuit and in the non-linear region is shown to depend, among other factors, on (a) type of electrode material (b) surface treatment (c) pH (d) presence of foreign ions and their concentrations (e) stirring or agitation (f) cell design parameters and the technique of single electrode potential measurement. Most significant experimental observations concerning the open circuit behavior include (a) transient open circuit voltages greater than the thermodynamically reversible potential of 1.23 volts under certain conditions, (b) experimentally observed effect of higher temperature on the open circuit voltage of the oxygen electrode is in a direction opposite to thermodynamic predictions. Experimental evidence is presented to show that the hydrogen and oxygen electrodes operating in the same bulk electrolyte under steady-state current flow conditions are always associated with significant pH changes (or concentration gradient) at each electrode. (Author)

AD-265 803 Div. 7
(TIPTE/CRJ) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A SEMICONDUCTOR CONVERTER OF DIRECT CURRENT INTO THREE-PHASE CURRENT (Poluprovodnikovyy Preobrazovatel' Postoyannogo Toka v Trekhfaznyy)
by P. P. Azbelev and S. S. Rybak. 4 Oct 61, 13p. incl. illus. (Trans. no. FTD-TT-61-43 of Izvestiya Vysshikh Uchebnykh Zavedeniy, Priborostoyeniye 4:47-54, 1961)
Unclassified report

DESCRIPTORS: (*Inverted rectifiers, *Semiconductors, Design.) (Technological intelligence, Inverter circuits.) (Compasses, Power supplies.) USSR, Translations.

A description is given of a semiconductor converter of direct current into 3-phase current with a power of up to 60 w, a line voltage of 36 to 40 v and a frequency of 400 c, developed at the Department of Automation and Remote Control of the B. I. Ul'yanov (Lenin) Leningrad Electrotechnical Institute. A justification of the principle chosen for constructing the circuit is given together with the characteristics of the finished instrument. The function of the instrument is to supply power for 3-phase asynchronous (gyroscopic or other type) motors, and, with minor changes in the circuit for 2-phase motors of automatic devices. (Author)

AD-265 814 Div. 7
(TIPTP/WH) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE MAXIMUM AND ACTUAL EFFICIENCIES OF ELECTROMAGNETS,
by I. I. Pekker and A. G. Nikitenko. 23 Oct 61, 8p. incl. illus. tables (Trans. no. FTD-TT-61-120 of Izvestiya Vysshikh Uchebnykh Zavedeniy - Elektromekhanika 11:94-97, 1960)
Unclassified report

DESCRIPTORS: (*Electromagnets, Mechanical properties.) (Translations, USSR.)

AD-265 848 Div. 7, 8
(TIPTE/DW) OTS price $4.60

Weston Instruments Div., Daystrom, Inc., Newark, N. J.
VARIABLE PRECISION METAL-FILM RESISTORS.
Interim development rept., 1 July-30 Sep 61.
31 Oct 61, 39p. incl. tables.
(Contract NObsr-77548, Proj. NE-081500/S.T. 17.11)
Unclassified report

DESCRIPTORS: (*Potentiometers, *Variable resistors, *Carbon resistors, Resistors, Metal films, Graphite, Resistance, Design, Tests.)

A radical contactor design change was instituted which curtailed investigations of metallic brush designs in favor of graphite brushes. Data obtained indicates wear rates to be reasonable with some initial drop in resistance as carbon deposition occurs. Noise figures obtained are relatively stable for extended cycling periods and are due mainly to high contact resistance introduced by carbon deposition. To expedite the testing of this contactor as regards wear and noise, elements were subjected to rotational life under load. Cycling was performed at 25 and 28 cpm on cyclers which do not allow noise testing at 2 cpm. Hand rotation of the cyclers at approximately 2 cpm showed negligible transient noise but contact resistance varied from 100 to 400 ohms. (Author)

Division 7 - ELECTRICAL EQUIPMENT

AD-265 857 Div. 7
(TIPTE/DLW) OTS price $5.60

General Electric Co., Syracuse, N. Y.
OPTIMIZATION OF THERMOELECTRIC ENERGY CONVERTERS.
Bimonthly progress rept. no. 5, 15 Dec 60-14 Feb 61,
ed. by L. Luft. 14 Feb 61, 53p. incl. illus. tables.
(Contract NObs-78403, Proj. SR-010024-IBR)
Unclassified report

DESCRIPTORS: (*Electric power production, *Power supplies, *Thermoelectricity, Heat transfer, Generators, Heat, Sources, Design.) (Calcium compounds, Lead compounds, Tantalum, Tellurides, Ceramic materials, Magnesium compounds, Oxides, Encapsulation, Tests.) (Magnesium compounds, Antimonides, Bismuth alloys, Intermetallic compounds, Arsenides, Chromium compounds, Selenides, Crystal structure, Electrical properties, Chemical properties, Mechanical properties, Hall effect, Measurement.)

The work on a selected system, designated thermal system no. 1, was completed using a computer program. Thermal system no. 1 is based on saturated steam at 533 K as the heat source and 291 K water as the heat sink. MgO-TiO2 ceramic was made into capsule bodies and used for successful encapsulation of lead telluride. Seebeck coefficient of Mg_3Sb_2 was measured in the 300 to 1250 K temperature range, the values ranging from 100 to 159 microvolts per degrees K. Electrical measurements were performed on $CrSb_{0.9}Se_{0.1}$, including Seebeck coefficient and electrical resistance. A number of II-IV compounds was prepared and their thermoelectric properties measured. (Author)

AD-265 869 Div. 7, 8
(TIPTE/DLW) OTS price $1.60

Melpar, Inc., Falls Church, Va.
A THIN-PLATE BATTERY.
Supplement to Quarterly rept. no. 6, 15 Aug-15 Nov 61, on Molecular Circuit Development, by J. F. Ambrose, J. Smit, and G. R. Crocker. 15 Nov 61, 17p. incl. illus. tables (Supplement to AD-265 870)
(Contract NOw 60-0362-c)
Unclassified report

DESCRIPTORS: (*Wet cells, Miniature electrical equipment, Power supplies, Ammonia, *Electrolytic cells, Cathodes (Electrolytic cells), Design, Tests, Effectiveness.) (Electronic circuits, Thin films, Design.) (Test equipment, Power meters, Design.)

Progress is reported on the task of demonstrating the feasibility of miniaturizing the NOL liquid ammonia activated cell. Over 90 cells were activated. The principal objectives were the optimization of cell parameters and the refinement of fabrication and activation techniques to ensure reproducibility. The fabrication of a second cell holder was completed to permit more rapid accumulation of data. The new cell holder is identical to the first except for a minor modification of the solution feed system. (Author)

AD-265 951 Div. 7, 25, 22
(TIPTP/WH) OTS price $6.60

Armour Research Foundation, Chicago, Ill.
TWO-CONDUCTOR ELECTRICAL TRANSMISSION LINE THEORY.
Quarterly rept. no. 1,
by H. G. Tobin. 25 Sep 61, 1v. incl. illus. tables (Rept. no. ARF 5167-Q1)
(Contract N178-7927)
Unclassified report

DESCRIPTORS: (*Electric igniters, Transmission lines.) (*Transmission lines, Audiofrequency cables, Low pass filters, Design.) (Audiofrequency cables, *Low pass filters, Materials, Electrical properties, Attenuation.)

Criteria are to be developed for the design of transmission lines which will act as low-pass filters. It is desired to design lines which will pass an audio firing signal to a squib in an explosive device, yet, at the same time, act as an attenuator to radio frequency signals which may be picked up from shipboard equipment. Several types of transmission line designs were considered and the optimum design to accomplish the desired rf attenuation determined. Included were lines which utilize skin effect and one which uses two layers of dielectric between the conductors. A material survey was made to determine available materials which exhibit frequency anomalies useful in the design of the type of line desired. The result is tabulated for future reference. It is hoped that the specific line design will enable the table to be used to determine which materials may be used to meet the requirements of the program. (Author)

AD-265 969 Div. 7, 4
(TIPTM/TCG) OTS price $2.60

Armour Research Foundation, Chicago, Ill.
CHEMICAL CONVERSION OF WASTE HEAT TO ELECTRICAL ENERGY.
Quarterly rept. no. 5, 1 July-30 Sep 61,
by C. Roland McCully. 27 Oct 61, 26p. incl. illus. tables (Rept. no. ARF 3182-6)
(Contract NOw 60-0760-c)
Unclassified report

DESCRIPTORS: (*Primary batteries, Electrolytic cells, Chemical reactions, *Heat into *Electricity, Energy, Anodes (Electrolytic cells), Cathodes (Electrolytic cells).) (Complex compounds, Arsenic compounds, Antimony compounds, Mercury compounds, Copper compounds, Tellurium compounds, Tin compounds, Chlorides, Melting, Thermodynamics.) (Absorption by Potassium compounds, Sodium compounds, Chlorides, Eutectics.) *Power supplies.

Selection of systems for continuing development include (1) $(AsCl_5)$-$AsCl_3$; $SbCl_3$-$SbCl_5$ at 300-600; (2) $HgCl_2$-$HgCl$; Hg-$HgCl$ at 480-950; and (3) $CuCl_2$-$CuCl$; $TeCl_2$-$TeCl_4$ at 480-950 K. The first system was operated as a miniature integrated unit. Regeneration was easily accomplished. Continuing development is directed toward larger systems and toward improvement of current density. Larger galvanic cells are also being developed for the second and third systems. Thermal regeneration of the latter 2 systems was accomplished, but separation of the products was not inherent, as it was with the first system. A method of selective absorption in a molten KCl-NaCl eutectic is being developed. Breadboard

models of the first and third systems are being developed. The system, $CuCl_2$-CuCl; $SnCl_2$-$SnCl_4$ at 480-2000 K, afforded promising galvanic cells, but require more severe material during regeneration. (Author)

AD-266 019 Div. 7
(TIPTE/DLW) OTS price $17.10

General Electric Co., Syracuse, N. Y.
OPTIMIZATION OF THERMOELECTRIC ENERGY CONVERTERS.
Final rept., 14 Mar 60-15 July 61,
ed. by Ludwig Luft. 31 July 61, 171p. incl. illus. tables.
(Contract NObs-78403, Proj. SR-010024-IBR)
Unclassified report

DESCRIPTORS: (*Electric power production, *Power supplies, *Thermoelectricity, Heat transfer, Generators, Heat, Sources, Design.) (Calcium compounds, Magnesium compounds, Oxides, Antimonides, Chromium compounds, Lead compounds, Tellurides, Ceramic materials, Encapsulation, Tests.) (Magnesium compounds, Materials, Intermetallic compounds, Crystal structure, Electrical properties, Chemical properties, Mechanical properties, Hall effect, Measurement.)

Thermal system analyses of typical water-cooled thermoelectric generators were made to establish optimized system performances and to determine the significance of changes in the properties of thermoelectric materials and other parameters. In the area of improving the utilization of thermoelectric materials, advances were made in increasing the temperature limits of encapsulation systems. Lead telluride was successfully encapsulated and 500 hour life tests at 600 C (Th) confirmed the merits of encapsulation. Three classes of materials were studied, covering both the theoretical and the practical problems involved in reaching the goal of better thermoelectric substances. (Author)

AD-266 028 Div. 7
(TIPTE/DLW) OTS price $11.50

General Electric Co., West Lynn, Mass.
VOLTAGE REGULATION AND POWER STABILITY IN UNCONVENTIONAL ELECTRICAL GENERATOR SYSTEMS.
Quarterly progress rept. no. 5, 30 June-30 Sep 61, 30 Sep 61, 155p. incl. illus. tables.
(Contract NOw 60-0824-c)
Unclassified report

DESCRIPTORS: (*Electric power production, *Power supplies, *Thermoelectricity, *Thermionic emission, *Fuel cells, Generators, *Voltage regulators, Switching circuits, Control systems, Rectifiers, Stability, Design.) (Power supplies, Sources, Voltage, Impedance, Electronic circuits, Semiconductors, Tests.)

Methods of voltage control and internal impedance characteristics of a thermoelectric source are discussed and illustrated with test data. Information is included on the steady-state electrical and thermal characteristics, dynamic characteristics, and methods of internal control of output voltage, of vacuum and vapor thermionic converters. Design data giving the weight and efficiency of series-regulating switching circuits, DC-DC power transistor and silicon controlled rectifier circuits, and DC-AC silicon controlled rectifier circuits are presented. The systems evaluation approach to be used is discussed. (Author)

AD-266 036 Div. 7, 4
(TIPTE/DLW) OTS price $3.60

Ionics, Inc., Cambridge, Mass.
STUDY OF ION EXCHANGE MEMBRANE FUEL CELL COMPONENTS.
Final rept.,
by Robert M. Lurie, Ralph J. Shuman, and Hans I. Viklund. 30 Oct 61, 19p. illus. tables.
(Contract DA 44-009-eng-4554)
Unclassified report

DESCRIPTORS: (*Fuel cells, *Power supplies, Ion exchange, Hydrogen, Oxygen, Membranes, Catalysts, Electrodes, Thickness, Dry cells, Electrolytes, Polymers, Effectiveness, Resistance, Tests, Design.) Electrochemistry, Materials.

The results are presented of work on the development of improved hydrogen-oxygen ion exchange membrane fuel cells. Studies included catalysts electrode structure, membrane composition and thickness, cell design, and structure. This work demonstrated the advantages of the concept of a dual membrane cell. Major features include safety, ease of humidification in air-breathing cells, ease of cooling and water removal in oxygen cells, and high allowable current densities (lower cell weight). Over 6 weeks of continuous operation at 16 amps/sq.ft. at room temperature and atmospheric pressure with no change in performance indicates the advance in the state of the art of membrane fuel cells that was obtained. (Author)

8. ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-265 507 Div. 8
(TIPTE/DLW) OTS price $3.60

Westinghouse Electric Corp., Elmira, N. Y.
LOW NOISE, LINEAR, VARIABLE GAIN, R. F. AMPLIFIER.
Quarterly rept. no. 1, 13 June-15 Sep 60,
by J. P. Pietrzyk, A. Van der Jagt and R. Peak.
17 Oct 60, 33p. incl. illus.
(Contract NObsr-81509)
Unclassified report

DESCRIPTORS: (*Radiofrequency amplifiers, Linear systems, Noise (Radio), Reduction, *Radio interference, Analysis.) (Electron tubes, Deflection, Electron beams, Electron guns, Electronic circuits, Design.) (*Triodes, Electronic circuits, Tuned circuits, Modulation, Tests.) Amplifiers.

An analysis of amplifier interference phenomena in relation to various tube transfer-characteristics is developed. Two possible approaches to diminish interference effects are proposed; a specially designed deflection tube with a linear transfer-characteristic, and a special circuitry which compensates for the curvature of the transfer-characteristic curve of a conventional amplifier tube so as to linearize the

transfer-characteristic of the amplifier system. The basic design of a sheet beam deflection tube was completed and calculations were of the deflection sensitivity, beam current density, and transconductance characteristics. Tooling for the construction of the preliminary design sheet beam deflection tube was completed and parts were fabricated. Linearity of a 3 triode circuit was measured by applying a ten volt peak-to-peak, 60 cycle signal to the grid of the input tube. The 3 triode circuit was refabricated and tuned circuits were added in order to determine whether the linearity of this circuit would actually reduce cross modulation. (Author)

AD-265 509 Div. 8
(TIPTE/DLW) OTS price $6.60

Westinghouse Electric Corp., Elmira, N. Y.
LOW NOISE, LINEAR, VARIABLE GAIN, R.F. AMPLIFIER.
Quarterly rept. no. 2, 16 Sep-15 Dec 60,
by J. P. Pietrzyk, A. Van der Jagt and R. Pear.
16 Jan 61, 35p. incl. illus.
(Contract NObsr-81509)
Unclassified report

DESCRIPTORS: (*Radiofrequency amplifiers, Linear systems, Noise (Radio), *Radio interference, Reduction, Analysis.) (Electron tubes, Deflection, Electron beams, Pentodes, Triodes, Electronic circuits, Signal-to-noise ratio, Harmonic analysis, Design, tests.) Amplifiers.

The first experimental results on a beam deflection model are given. On 35 different tests with changed models it was not possible to get the necessary current of the order of 20-25 ma through the deflection plates. The influence of beam density and initial velocity on the performance of deflection tubes is discussed and some general considerations are made on deflection tube systems. It is shown that, in the beginning, it is more reasonable to work with an uncompressed beam and with a larger cathode. In the 3-tube approach, it is shown that one can reach very good linearity with two tubes (pentodes or triodes) at low frequencies. The application of 2 or 3 different frequencies at the same time, however, shows no satisfactory performance. (Author)

AD-265 533 Div. 8, 5
(TIPSE/RD) OTS price $1.10

Electronic Defense Labs., Mountain View, Calif.
COMMUNICATION IN THE PRESENCE OF STATISTICALLY DEPENDENT INTERFERENCE,
by Nelson M. Blachman. 1 June 61, 6p. (Technical memo. no. EDL-M392)
(Contract DA 36-039-sc-87475)
Unclassified report

DESCRIPTORS: (*Communication systems, *Communications theory, *Interference.) (Interference, Signal-to-noise ratio, Statistical analysis, Errors, Probability.)

AD-265 535 Div. 8
(TIPSE/DLW) OTS price $4.60

General Telephone and Electronics Labs., Inc., Bayside, N. Y.
STUDIES OF ELECTRON TUBE MATERIALS AND THERMIONIC EMISSION PROCESSES.
Scientific rept. no. 6, 1 July-30 Sep 61.
11 Oct 61, 48p. incl. illus. (Rept. TR61-704-104-204-205-208.12)
(Contract AF 19(604)7286)
Unclassified report

DESCRIPTORS: (Cathodes (Electron tubes), *Oxide cathodes, Diodes, Nickel, Materials, Spectrographic analysis, Chemical impurities, Gases, Electron microscopy, Measurement, Tests.) (Oxide cathodes, *Thermionic emission, Processing, Measurement.) (Electron tubes, Tungsten, Aluminum compounds, Barium, Crystals, Materials, Manufacturing methods, Test equipment.)

The emission results obtained to date appear to indicate that the present diode system is very clean and that the available pure nickel is relatively free of impurities. Complementary data on crystal plane orientation in nickel 220 for faces lacking emission reversal were shown in the stereographic triangle with a slight correction for the previously determined plane of maximum emission reversal. A compound unit for measuring cathode temperature in a continuous and automatic way was designed. Temperature cycles of great uniformity and long duration were realized by introducing a linear timer drive which is coupled to the cathode heating supply. By direct display of a 1/8-inch diameter cathode on the 21-inch screen the major phases of the activation process of the impregnated tungsten matrix cathode were demonstrated. (Author)

AD-265 541 Div. 8
(TIPTE/DLW) OTS price $2.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
THEORY AND DESIGN OF SPHERICAL REFLECTOR ANTENNAS. ANNOTATED BIBLIOGRAPHY,
comp. by George R. Evans. Aug 61, 17p. (Special bibliography no. SB-61-27; Rept. no. 5-73-61-1)
Unclassified report

DESCRIPTORS: (*Antennas, Helical antennas, Reflectors, Electronic scanners, Theory, Design, *Bibliography.)

A search was undertaken to collect published information on the use of a spherical reflector as a wide-angle antenna. The period generally covered is 1940 to the present. To make the bibliography more comprehensive and possibly more useful, articles and reports gathered during the search, but not directly applicable to the specific subject, are included. (Author)

AD-265 548 Div. 8
(TIPTE/DLW) OTS price $3.60

Radio Corp. of America, Lancaster, Pa.
DESIGN, DEVELOP, AND EVALUATE A HIGH-POWER INTEGRAL CIRCUITED TETRODE FOR 215 MEGACYCLE OPERATION.
Quarterly interim technical rept. no. 2, 1 July-30 Sep 61,
by T. E. Yingst, I. E. Martin, and F. F. Marinaro.
31 Oct 61, 27p. incl. illus.
(Contract NObsr-85371)
Unclassified report

DESCRIPTORS: (*Tetrodes, Very high frequency, Electronic circuits, Cavity resonators, Ceramic materials, Broadband, Power amplifiers, Radiofrequency power, Design, Test equipment.) Electron tubes.

Efforts were continued on the design of the output circuits, radiofrequency by-pass systems, input circuits, and modification of test equipment. The output circuit selected consists of 2 coupled cavities which produces a double-peaked frequency response. The input circuit employs a 4 terminal network. The swamping power is applied at the grid-cathode terminals and the drive power is applied to the grid-screen terminals. A compact vacuum by-pass is made possible by periodic foreshortening. (Author)

AD-265 552 Div. 8
(TIPJE/RD) OTS price $10.10

Stanford Electronics Labs., Stanford U., Calif.
NOISE FIGURES, NOISE TEMPERATURES, AND SYSTEM SENSITIVITY,
by Philip H. Enslow, Jr. 10 July 61, 111p. incl. illus. tables (Technical rept. no. 516-2)
(Contract DA 36-039-sc-78296)
Unclassified report

DESCRIPTORS: (*Noise (Radio), *Interference, Temperature, Electronic circuits, Linear systems.) (*Radio receivers, *Radar receivers, *Crystal video receivers, *Noise (Radio), *Noise (Radar), Signal-to-noise ratio, Crystal mixers.) (Electrical networks, Microwave networks, Interference, Noise (Radio), Noise (Radar), Mathematical analysis.)

The definitions of terms used in systems noise work are presented, as well as general techniques of describing noise power resulting from both the source and the excess noise added by the network under consideration. A unique feature presented is a unified development of 7 noise temperatures encountered in this field, with tables showing the relationships among them and their uses. A general technique for calculating the sensitivity of a receiver is presented and 3 examples are treated in detail: the simple crystal-video system, the crystal-video receiver with RF preamplification, and the superheterodyne system. All systems are divided into 2 classes for which the calculations are similar: receivers having only a simple detector, and those having some form of linear amplification preceding the detector. The final analysis of the noise performance of the system requires a comparison of the pre-detection and post-detection excess noise. This comparison is performed by referring all excess noise power to the detector input and classifying the system according to whether (a) the pre-detection noise predominates, (b) the post-detection noise predominates, or (c) the pre-detection noise and the post-detection noise are comparable in magnitude. (Author)

AD-265 577 Div. 8, 12
(TIPTB/JAB) OTS price $13.50

Autonetics, Downey, Calif.
A SURVEY OF THE LITERATURE ON RELIABILITY,
by Marnelle Kinney. 4 Oct 61, 198p. (Rept. no. EM-7335)
Unclassified report

DESCRIPTORS: (*Reliability, *Bibliography.) (Electronics, Electronic equipment, Electron tubes, Guided missiles, Quality control, Test methods.)

This bibliography on reliability is divided into the following subject headings: Robert Lusser Papers; General References; Books, Handbooks, and Manuals; Components and Circuitry; Design; Electron Tubes; Management and Manufacturing; Mathematical and Statistical Analysis; Missile Programs; Systems; Tests and Testing; and Proceedings and Symposiums. For those persons interested in computer reliability, a separate bibliography is being prepared under the number EM-7336. There are 521 references covering the period 1950-1961; however, the emphasis is on literature published in the past four years. An author index concludes the bibliography. (Author)

AD-265 627 Div. 8
(TIPTP/MFA) OTS price $1.60

Boston U., Mass.
IMPLICATIONS OF THE SECOND ORDER CONSERVATION LAW IN THE THEORY OF STATIONARY ELECTROMAGNETIC FIELDS,
by P. Roman and Tahira Minhaj. Sep 61, 11p.
(Scientific rept. no. 3)
(Contract AF 19(604)8022)
(AFCRL-778) Unclassified report

DESCRIPTORS: (*Electromagnetic fields, Theory by differential geometry, Tensor analysis, Transformations (Mathematics), Integral transforms, Partial differential equations.)

Straightforward but lengthy manipulations are applied to one of the second order conservation laws obtained previously in order to elucidate its physical content. As a result, a peculiar generalization of the energy conservation law is obtained. (Author)

AD-265 636 Div. 8, 26
(TIPTE/DLW) OTS price $10.50

Eitel-McCullough, Inc., San Bruno, Calif.
THE X626 HIGH POWER KLYSTRON DEVELOPMENT PROGRAM.
Final engineering rept. 15 Dec 55-15 Mar 59 on EIMAC X-626 Klystron.
15 Mar 59, 135p. incl. illus. tables.
(Subcontract to Continental Electronics Mfg., Co., Dallas, Tex., Contract AF 30(602)1441)
Unclassified report

DESCRIPTORS: (*Klystrons, Microwave amplifiers, L band, Radar equipment, Electron guns, Cavity resonators, Vacuum tube amplifiers, Tuning circuits, Power supplies, *Power amplifiers, Electronic circuits, Test equipment, Design, *Manufacturing methods, Processing, Tests.) Electron tubes, Amplifiers.

A NEW METHOD FOR MODULATING ELECTRON BEAMS FOR PULSE APPLICATIONS AND LINEAR AMPLITUDE MODULATION SYSTEMS, by George M. W. Badger. Paper presented at the I.R.E. Convention, 26 Mar 57, 7p. incl. illus.

The development is described of the X626 klystron and the equipment necessary to build and test the tube. The tube was designed as a final amplifier for high duty, long pulse, continuous radar serv-

ice and was built to combine in groups of 2 to 8 tubes for high peak power (10 Mw) operation at 400-450 mc. The X626 will deliver over 1.25 Mw peak power and over 75 KW average power at approximately 100 kv beam voltage and approximately 1.9 amperes average beam current, with a gain of 26 db. The X626 is a three cavity, externally tunable, modulating anode, pulsed type, liquid and forced air cooled, unipotential cathode, insulated collector, 400-450 mc, amplifier klystron. (Author)

AD-265 659 Div. 8
(TIPTE/RD) OTS price $8.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
PROPAGATION OF RADIO WAVES AND ANTENNA FEEDER DEVICES (Rasprostraneniye Radiovoln in Antennofidernyye Ustroystva),
by Ya. M. Rubinsteyn. 4 Aug 61, 96p. (Trans. no. MCL-959 of Morskoy Transport:pp. 317-379, 1960)
Unclassified report

DESCRIPTORS: (Technological intelligence, USSR, Translations.) (*Radio waves, *Microwaves, *Propagation, Ionospheric propagation, Atmosphere, Diffraction, Scattering, Attenuation.) (Radio fields, Intensity, Measurement.) Radio communication systems, Microwave communication systems, Slot antennas, *Antenna horns, Lens antennas.

AD-265 690 Div. 8
(TIPTE/RD) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
AN INTEGRATING DEVICE,
by O. I. Koptev, A. P. Panov, and G. V. Maslov. 3 Oct 61, 2p. incl. illus. (Trans. no. MCL-1200 of Byulleten' Izobreteniy 15:pp. 60, 1960)
Unclassified report

DESCRIPTORS: (Technological intelligence, USSR, Translations.) (*Pulse integrators, *Pulse integration, Electronic circuits, Stability.) (Backward-wave oscillators, Microwave oscillators, Silicon, Transistors.)

A device is proposed which makes it possible to boost the output current and eliminate the influence of the instability of the input pulse amplitude. This is done by connecting a silicon stabilitron tube in parallel with the proportioning capacitor. A transistor is used instead of the ordinary diodes to eliminate instability in the circuit. Calculations and experiments show that the described circuit causes an approximate 2.5-fold increase in output current across the instrument. (Author)

AD-265 691 Div. 8
(TIPTE/RD) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
A METHOD OF TRANSMITTING A SIGNAL OF STANDARD FREQUENCY AND PHASE TO DISTANT POINTS (Sposob Peredachi Signala Etalonnoy Chastoty I Fazy V Udalennyye Punkty),
by yu. F. Korkunov. 1960, 3p. (Trans. no. MCL-1220 of Byulleten' Izobreteniy 12:pp. 24, 1960)
Unclassified report

DESCRIPTORS: (Technological intelligence, USSR, Translations.) (*Radio signals, *Radio transmission, Propagation, Phase shifters.)

A method is proposed for transmitting radio signals which makes it possible to decrease considerably (by at least an order) the dependence of the phase on the propagation conditions. Frequency signals are transmitted from two neighboring points located at a distance comparable with half the wavelength. At one of the points the signal frequency and phase are tuned according to the standard-frequency signal by varying the frequency and phase of the signals being emitted. At the reception point a difference-frequency signal is separated and is used as the standard-frequency signal. The frequencies of both signals being transmitted are chosen sufficiently close together; while propagating, both signals traverse practically the same distance; therefore the phase of the difference signal depends to a considerably lesser extent on the propagation conditions. At the receiving end an additional phase shift is introduced to take into account the distance from the transmitter to the receiver and the parameters of the system. (Author)

AD-265 695 Div. 8
(TIPSE/DLW) OTS price $4.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
THE NOISE OF PARAMETRIC AMPLIFIERS BASED ON SEMICONDUCTOR DIODES AND METHODS OF EFFICIENTLY REDUCING IT,
by S. V. Pertsov. 13 Oct 61, 41p. incl. illus. tables (Trans. no. MCL-1230 of Poluprovodnikovyye Pribory i Ikh Primeniniye, Sbornik Statey, Moscow, Issue 6:63-91, 1960)
Unclassified report

DESCRIPTORS: (*Parametric amplifiers, Diodes, Semiconductors, *Noise (Radio), Signal-to-noise ratio, Mathematical analysis, Reduction.) (Microwave amplifiers, Superhigh frequency, Effectiveness, Sensitivity, Measurement, Theory.) (Technological intelligence, USSR, Translations.)

The noise characteristics of diode parametric amplifiers are examined. Formulas for the noise factor of single-circuit and two-circuit parametric amplifiers and converting amplifiers are derived. Methods of reducing the noise factor are considered which will make it possible to produce parametric amplifiers with noise characteristics as good as those of masers. The use of parametric amplifiers at the input of superhigh frequency receiving devices makes it possible to raise the limiting sensitivity to the potential limit permitted by the noise level of the antenna. (Author)

AD-265 698 Div. 8, 26
(TIPTE/DLW) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
METHOD OF MANUFACTURING PRINTED CIRCUITS,

by G. M. Belevich and I. I. Yefimenko. 6 Oct 61, 2p. (Trans. no. MCL-1235 from Byulleten' Izobreteniy 24, 1960)

Unclassified report

DESCRIPTORS: (*Printed circuits, Electronic circuits, Processing, *Manufacturing methods.) (Technological intelligence, USSR, Translations.)

Printed circuits manufactured by the known method of pressing a copper powder, which is applied as an even layer onto a base with a thermo-adhesive coating, by a heated relief matrix still have a sufficiently large resistance due to the low compactness of the printed conductors. A method is described which makes it possible to eliminate this shortcoming of the existing method. A greater structural compactness of the printed conductors and smaller resistance of the latter is achieved by adding from 5 to 25% by weight (mainly 10-12%) tin powder to the copper powder. (Author)

AD-265 704 Div. 8
(TIPTE/RD) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
A MECHANICAL WAVEGUIDE DEVICE FOR FREQUENCY CONVERSION,
by M. S. Yanovskiy and Ye. M. Kuleshov.
21 Sep 61, 2p. incl. illus. (Trans. no. MCL-1282 of Byulleten' Izobreteniy 3:1-2, 1961)

Unclassified report

DESCRIPTORS: (Technological intelligence, USSR, Translations.) (*Waveguides, *Frequency converters, Frequency-shift converters, Doppler systems.) Electromagnetic wave reflections.

A mechanical waveguide device for frequency conversion is described. It is based on the use of the doppler effect of a shift in the frequency of electromagnetic waves when they are reflected from moving surfaces; it has the special feature that, in order to increase the value of the frequency shift, it is made in the form of a ring waveguide with square cross section, split along the neutral line, with a fixed upper section and a movable lower section containing one or two short-circuited waveguides for the formation of a revolving, reflecting, discontinuity. (Author)

AD-265 714 Div. 8
(TIPTE/RD) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
DELAY LINE,
by S. A. Doganovskiy. 6 Oct 61, 3p. incl. illus. (Trans. no. MCL-1308 from Byulleten' Izobreteniy 9, 1960)

Unclassified report

DESCRIPTORS: (Technological intelligence, USSR, Translations.) *Delay lines, Capacitors, Memory devices, Relays, Electronic circuits, Cathode followers.

A delay line circuit is described. Readout from one capacitor and recording from the preceding cascade on the next capacitor occurs during each cycle in each cascade of the delay line. This special feature of the circuit makes it possible to obtain the same accuracy of reproducing a function as in known circuits with half the number of triodes, or with the same number of triodes and same commutation speed of the contacts to obtain a high accuracy of reproducing a function on the delay-line output. (Author)

AD-265 716 Div. 8, 7
(TIPTE/RD) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
AN ELECTRONIC SELF-TUNING TWO PARAMETER SERVO-SYSTEM FOR THE INVESTIGATION OF VARIOUS PHYSICAL PARAMETERS,
by B. B. Timofeyev and G. K. Arutyunov.
3 Oct 61, 4p. incl. illus. (Trans. no. MCL-1311 from Byulleten' Izobreteniy 15, 1960)

Unclassified report

DESCRIPTORS: (Technological intelligence, USSR, Translations.) (*Servo systems, *Servo-mechanisms, Transducers, Control systems, Switching circuits, Electronic equipment, Tuning devices.)

A servo system is described which makes it possible to determine (predict) the limit toward which some physical process tends, long before the process terminates. For example, using a thermocouple, the drop in temperature of molten metal can be measured long before the metal has been completely heated. The system contains a transducer for the linear conversion of changes in the investigated physical process into changes of electric voltage. The limit (asymptote) to which the investigated physical process tends is determined (predicted) before the process terminates by using an electronic analog of the function which is the quotient which results when the time-dependence of the investigated process is divided by the equation of the asymptote. The voltage at the analog input, one of the system parameters, is maintained such that the voltage at the analog output equals (on the selected scale) the voltage at the transducer output. The analog is controlled with a control unit which changes some parameter of the analog (the second parameter of the system) until it corresponds to the investigated physical process. (Author)

AD-265 718 Div. 8
(TIPTE/RD) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
A METHOD OF PULSE-PHASE AUTOMATIC FREQUENCY CONTROL OF AN OSCILLATOR,
by Ye. Taymanov. 4 Oct 61, 2p. incl. illus. (Trans. no. MCL-1313 from Byulleten Izobreteniy 16, 1960)

Unclassified report

DESCRIPTORS: (Technological intelligence, USSR, Translations.) (Oscillators, *Radio-frequency oscillators, *Frequency stabilizers.)

A method of pulse-phase automatic frequency control of an oscillator is described by comparison of the phases on an intermediate frequency, differing in that, for the purpose of raising the level of the control voltage and obtaining twice the number of stable frequencies uniformly

distributed in a grid, which is shifted with respect to the harmonics of the reference frequency, the mixer is made in accordance with a pulse-phase detector circuit, while a reference pulse signal is fed to the main pulse-phase detector after fourfold division of the frequency. (Author)

AD-265 719 Div. 8
(TIPTE/CRJ) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
A SPLITTER OF SUPERHIGH-FREQUENCY ENERGY WITH WEAK COUPLING BETWEEN THE CHANNELS,
by D. I. Mirovitskiy. 4 Oct 61, 2p. incl. illus. (Trans. no. MCL-1315 from Byulleten Izobreteniy 16, 1960)
Unclassified report

DESCRIPTORS: (Waveguides, *Waveguide couplers, Wave transmission, USSR, Design.) (Electromagnetic waves, Microwaves, Superhigh frequency, Propagation.) (Antennas, Transmission lines.)

A splitter is described of superhigh-frequency energy with weak coupling between the channels, differing in that, for the purpose of increasing the wideness of its band, it is made in the form of several surface-wave lines connected with a common feeder and intersecting it at an acute angle or else smoothly branching out. The surface-wave lines are made of smooth or periodic delay systems, e.g., dielectric or ribbed, which are excited by a surface wave of asymmetrical type. (Author)

AD-265 741 Div. 8
(TIPTP/MFA) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
CONCERNING THE THEORY OF VIBRATION ELEMENTS IN ELECTRETS,
by A. N. Gubkin, V. F. Sergiyenko, and N. M. Trofimenko. 17 Oct 61, 7p. incl. illus. (Trans. no. MCL-1405 of Pribory i Tekhniki Experimenta 2:166-169, 1961)
Unclassified report

DESCRIPTORS: (Translations, USSR.) (Design, *Electrets, *Vibration, Theory, Alternating current, Circuits, Electric fields, Electrode, Dielectrics.)

A theory of vibration elements is described, which work with the use of electrets. The results of the theory were verified experimentally on a model of the electret vibration element. (Author)

AD-265 753 Div. 8
(TIPTE/RD) OTS price $8.10

Electronic Communications, Inc., Timonium, Md.
MILLIMETER WAVE RESEARCH,
by M. Cohn, M. J. King, and others. 31 Aug 61, 84p. incl. illus. tables, 15 refs. (Technical note no. 1)
(Contract AF 30(602)2457, Proj. 4506)
(RADC TN 61-213)
Unclassified report

DESCRIPTORS: (Microwave equipment, Microwave frequency, *Microwaves, Transmission, *Radio transmission.) (Wave guides, Transmission lines, Microwave equipment.) Optical systems.

Analyses are being carried out to determine the characteristics and usefulness of a variety of transmission methods and associated components for possible utilization in the 1 millimeter to 0.1 millimeter wavelength region of the electromagnetic spectrum. Preliminary work is underway on equipment and instrumentation to be used in making measurements above 300 Gc. The report describes and compares the characteristics of enclosed waveguides, the H-guide and trough guide, single-wire transmission lines, dielectric waveguides (and fiber optics), the beam waveguide, and refractive or reflective transmission methods employing repeated image formation. A further study was made on Fresnel zone plates, and a description is given of their behavior over a wide frequency range, showing how they may be used as focusing devices or as filter elements. (Author)

AD-265 754 Div. 8, 25
(TIPTP/GW) OTS price $4.60

Electronics Research Lab., U. of Calif., Berkeley.
THE SCATTERING OF MICROWAVES FROM MULTIPLE SPHERES,
by K. A. Moe and D. J. Angelakos. 2 June 61, 13p. illus. (Series no. 60, Issue no. 365)
(Contract AF 49(638)1043)
(AFOSR-1186)
Unclassified report

DESCRIPTORS: (*Microwaves, *Scattering, *Electromagnetic wave reflections, Spheres, Measurement.) (Electromagnetic waves, Reflection, Bodies of revolution.)

An approximate method of calculating the back scattered energy of certain types of arrays of spheroids using geometrical optic is applied to the case in which spheres are merged to a single sphere. Supplementary data were assimilated which allows the determination of the relative back scattered energy for all angles of incidence. Thus there exists an accurate experimental spectrum of the back scattering cross-section of these arrays for the range of separations at which the individual scattering hypothesis cannot be reasonably assumed. (Author)

AD-265 755 Div. 8
(TIPTP/WH) OTS price $4.60

Electronics Research Lab., U. of Calif., Berkeley.
PHASE STABILITY IN FREQUENCY MULTIPLIERS,
by Ralph R. Dimmick. 2 June 61, 43p. incl. illus. tables (Series no. 60, Issue no. 366)
(Contract AF 49(638)1043, Proj. 4751)
(AFOSR-1014) Unclassified report

DESCRIPTORS: (Electron tubes, Electronic circuits, *Frequency multipliers, Microwaves, Frequency meters, Stability, Interference, *Noise (Radio).) (Noise (Radio), Temperature.)

Work is described pertaining to phase stability of frequency multipliers with particular emphasis on Class C vacuum-tube frequency multiplier chains. Various sources of phase perturbations were considered and experimental work performed to establish the magnitude of their effects on a practical device. Temperature variation was

found to be the most serious source of phase instability. A general discussion of frequency standards is included and the need for frequency multipliers in the translation of a standard frequency is pointed out. Frequency multiplier chains are discussed and the Class C multiplier selected for the major portion of the work because of the simplicity of its design and its general use. Sources of phase perturbation considered include tube noise, temperature variation, and supply-voltage variation. The effects of such sources were determined on an experimental multiplier chain and recommendations were made regarding multiplier chain design. Indications were that frequency errors due to phase perturbations could be held to less than one in 10 to the 11th power with suitable precautions. It is suggested that a similar program on semiconductor multiplier chains would be of interest. (Author)

AD-265 758 Div. 8
(TIPTE/CRJ) OTS price $5.60

Hughes Research Labs., Malibu, Calif.
RESEARCH AND DEVELOPMENT OF TWO-COLOR TUBES.
Final engineering rept., 25 Mar 60-31 Oct 61.
Oct 61, 53p. incl. illus. tables.
(Contract NObsr-81199)
Unclassified report

Original contains color plates; all ASTIA reproductions will be in black and white. Original may be seen in ASTIA Hq.

DESCRIPTORS: (*Storage tubes, Colors, Coding, Phosphors, Operation, Design.) (Display systems, Cathode ray tubes.) Electron tubes.

A direct-view storage tube was developed which is capable of displaying stored information in either of 2 colors or in intermediate hues. The operating principle is based on the fact that flood electrons which pass through the holes in the storage mask when the storage-surface potential is near cutoff fall within small areas on the viewing screen opposite the storage-mask holes, whereas flood electrons which pass through the holes when the potential is near its maximum, i.e., flood-gun-cathode potential, fall on larger overlapping areas on the viewing screen. The viewing screen consists of a pattern incorporating 2 phosphors: one occupies small areas in register with the storage-mask holes, and the other occupies areas surrounding the first. The tube, which is 10 inches in diameter, can be operated with simple circuitry, essentially the same as that required for conventional halftone storage tubes. (Author)

AD-265 772 Div. 8
(TIPTE/CRJ) OTS price $1.60

Naval Ordnance Lab., Corona, Calif.
THREE SONIC DELAY LINES FOR A VLF SYSTEM,
by R. W. LaBahn. 1 Oct 61, 20p. incl. illus.
(NOLC rept. no. 552)
Unclassified report

DESCRIPTORS: (*Solid delay lines, *Delay lines, Sound, *Acoustics, Tests, Design.) (Plastic tubing, Sound transmission.) (Radio signals, Very low frequency, Delay lines.) Electronic circuits.

The design, construction, and operating characteristics of 3 sonic delay lines are described. The lines were built by the Naval Ordnance Laboratory Corona to produce the delay of electrical signals within the frequency range of 1 to 30 kc. Two delay lines (25-ms and 65-ms), designed for 1.3-kc signals, functioned satisfactorily; a 0.5- to 5-ms delay line for 10- to 30-kc signals was unsatisfactory because of relatively strong spurious signals. The conclusion is reached that for the higher-frequency application a sonic delay line based on a different principle would be more suitable. (Author)

AD-265 790 Div. 8, 25, 4
(TIPTP/JDP) OTS price $10.50

Electronics Research Lab., U. of Calif., Berkeley.
MICROWAVE PROPAGATION IN AROMATIC COMPOUNDS,
by N. Kusnezov. 31 June 61, 131p. incl. illus. tables, 34 refs. (Series no. 60, Issue no. 369)
(Contract AF 49(638)1043)

(AFOSR-1187) Unclassified report

DESCRIPTORS: (Propagation of *Microwaves in *Organic compounds.) (*Organic compounds, *Electrical properties, Conductivity, Measurement, Hall effect, Dielectric properties, X band, Magneto-optic rotation.) (Semiconductors, Photoconductivity, Phthalocyanines, Naphthalenes, Anthracenes, Polycyclic compounds.)

An investigation of those electrical properties of aromatic compounds which are related to their potential uses as microwave modulators or mixers is presented. The study includes: repeat measurements of conductivity and variations of conductivity of aromatic materials as function of the intensity and frequency of the irradiating light, measurement of the Hall constants of the materials, investigation of the variation of the dielectric constant of the materials in x-band range in the dark and while irradiated by light, and investigation of the x-band magneto-optical properties of the materials. Interest is in the photosemiconducting compounds and anthracene, naphtalene and phtalocyanine are the materials. (Author)

AD-265 834 Div. 8, 27, 7
(TIPTM/SEB) OTS price $2.60

AeroChem Research Labs., Inc., Princeton, N. J.
THE GLOW DISCHARGE AS AN ADVANCED PROPULSION DEVICE,
by S. I. Cheng. Mar 61, 22p. incl. illus.
(Technical publication no. 33)
(Contract Nonr-277300)
Unclassified report

DESCRIPTORS: (*Glow discharges, *Electric propulsion, Electric field, Electric potential, Electron tubes, Gases, Ions, Electrons, Plasma physics, Ionization, Voltage, Dynamics, Thrust, Specific impulse, Theory, Equations.)

The generation of thrust directly from electric power through a gaseous discharge is investigated with a one dimensional model. The thrust consists of 2 parts, the electric pressure and the electric wind. In terms of the ionization constants of gases and of the mobility constants of ions and electrons, both the electric pressure and the electric wind are obtained in simple dimensionless form. At low gas pressures, the thrust contribution from electric pressure is

usually much larger than that from electric wind. The latter may be of comparable magnitudes or even much larger at higher (atmospheric) discharge pressures and larger inter-electrode distances. The over-all thrust level is proportional to the gas pressure in the discharge (P) squared. For p = 1 mm Hg, the thrust is less than or about equal to 1 dyne/ sq cm. The specific thrust/unit power is no greater than 10 mg wt/kw. Thrust is derived from electric wind at a much larger specific power consumption. The low specific thrust rules out using such a propulsion system as a booster. For application in outer space, it suffers from the limited specific impulse because propellant gas must be carried aboard. The system has other interesting applications such as a positive control device for hypersonic vehicles at an altitude of 100-200 x 10,000 ft. (Author)

AD-265 843 Div. 8
(TIPTE/DLW) OTS price $7.60

Airborne Instruments Lab., Inc., Deer Park, Long Island, N. Y.
APPLICATION OF SEMICONDUCTOR DIODES TO LOW-NOISE AMPLIFIERS, HARMONIC GENERATORS, AND FAST-ACTING TR SWITCHES.
Final technical rept. May 58-June 61,
by J. C. Greene, J. Kliphuis and others. June 61, 74p. incl. illus. tables, 18 refs. (Rept. no. 4589-1)
(Contract AF 30(602)1854, Proj. 4506)
(RADC TR 61-202) Unclassified report

DESCRIPTORS: (*Diodes, Semiconductors, *Parametric amplifiers, Microwave amplifiers, Noise (Radio), Reduction, *Frequency multipliers, Transmit-receive tubes, Switching circuits, Crystal mixers, *Microwave oscillators, *Electronic switches, Design, Theory.) (Diodes, Electron tubes, L Band, C Band, S Band, X Band.) (Broadband, Amplifiers, Electronic equipment, Tests.)

Theoretical and experimental work is described which was performed on: (1) the use of varactor diodes as low-noise amplifiers, harmonic generators, and fast-acting TR switches, and (2) the use of tunnel diodes as amplifiers, mixers, and oscillators. (Author)

AD-265 850 Div. 8, 12
(TIPTE/DLW) OTS price $3.60

Electronic Defense Labs., Mountain View, Calif.
MECHANICAL DESIGN AND DEVELOPMENT OF LIGHTWEIGHT ANTENNA REFLECTORS AND POSITIONING DEVICES.
PART 1. AN INVESTIGATION OF ANTENNA REFLECTOR AND POSITIONER DESIGNS,
by Mack Suliteanu. 30 June 61, 25p. incl. illus. tables. (Technical memo. no. EDL-M350, pt. 1)
(Contract DA 36-039-sc-85402)
Unclassified report

DESCRIPTORS: (*Satellite vehicle antennas, *Radar antennas, Parabolic antennas, *Radar reflectors, Reflectors, Antennas, Antenna hardware, Mobile, Airborne, Design.) Load distribution.

A systematic research and development program was conducted on antenna reflectors and positioning devices. The results can be applied to the development of lightweight reflectors of large aperture and lightweight positioners for use as advanced earth satellite vehicle ECM and SIGINT equipment. Designs which can be rapidly fabricated, installed, and tested are emphasized. (Author)

AD-265 851 Div. 8
(TIPTP/JW) OTS price $5.60

Electronic Defense Labs., Mountain View, Calif.
THE H-GUIDE. A USEFUL WAVEGUIDE FOR MILLIMETER WAVES,
by John Reindel. 11 Aug 61, 34p. incl. illus.
(Technical memo. no. EDL-M377)
(Contracts DA 36-039-sc-85402 and DA 36-039-sc-87475)
Unclassified report

DESCRIPTORS: (*Waveguides, Wave transmission, Microwaves.) (*Wave transmission, Transducers, Power dividers, Waveguide couplers, Phase shifters.) (Electromagnetic waves, Propagation, Experimental data.)

A new type of waveguide, the H-guide consists of two parallel metal plates and a dielectric slab sandwiched perpendicularly between the plates. Characteristics of the guide make it useful at frequencies in the millimeter-wave region. In comparison to a rectangular waveguide, the H-guide has greater cross-sectional dimensions, lower attenuation, higher power-handling capacity, and no requirement for electric contact between guide sections. The H-guide is studied theoretically and experimentally; attenuation constants are calculated and measured, use of foam dielectrics is evaluated, and maximum transmitted power at breakdown is calculated. Usefulness of H-guide is demonstrated through design of several components such as transducers, bends, power dividers, and directional couplers. (Author)

AD-265 852 Div. 8
(TIPTP/JW) OTS price $3.60

Electronics Research Lab., U. of Calif., Berkeley.
A SOLUTION TO THE FREQUENCY-INDEPENDENT ANTENNA PROBLEM,
by B. Cheo, V. H. Rumsey, and W. J. Welch.
14 June 61, 38p. incl. illus. (Series no. 60, Issue no. 372)
(Contract DA 36-039-sc-84923)
Unclassified report

DESCRIPTORS: (Antenna radiation patterns, Amplifiers, Frequency shift, Electromagnetic properties.) (Antennas, *Helical antennas, Excitation, Attenuation, Wave transmission.) (Partial differential equations, Antenna radiation patterns.)

A solution of Maxwell's equations is obtained for an antenna consisting of an infinite number of equally spaced wires in the form of coplanar equiangular spirals. Radiation amplitude patterns obtained from this solution agree closely with measurements on two-element spiral antennas. The phase pattern shows the approximate validity of a phase center at a distance behind the antenna which decreases with the tightness of the spiral. The current distribution clearly shows increased attenuation with increase in the tightness of the spiral thus showing how the frequency-independent mode depends on the curvature. A remarkable feature

of the solution is that the current consists of an inward traveling wave at infinity when the antenna is excited in that sense which produces an outward wave at the center. (Author)

AD-265 853 Div. 8, 25
(TIPTP/JW) OTS price $2.60

Electronics Research Lab., U. of Calif., Berkeley.
A VARIATIONAL SOLUTION FOR THE SCATTERING OF ELECTROMAGNETIC PULSES FROM A CYLINDER OF FINITE LENGTH,
by W. J. Welch. 11 Aug 61, 27p. incl. illus.
(Series no. 60, Issue no. 392)
(Contract AF 49(638)1043)
(AFOSR-1534) Unclassified report

DESCRIPTORS: (*Electromagnetic waves, Electromagnetic wave reflections, Cylindrical bodies, *Scattering, Conductors, Echo ranging.) (Scattering, Damping, Pulse generators.) Radar echo areas, Partial differential equations.

The problem of the scattering of an essentially plane electromagnetic pulse by a thin metallic cylinder of finite length is treated by means of a variational formula derived in an earlier paper (IRE PGAP Vol. AP-8, No. 1:68, Jan. 1960). The pulse is a delta function, and it is assumed that the current induced on the scatterer is a damped sinusoid with the frequency of oscillation such that the cylinder is one half wavelength long and the damping due to radiation. The characteristic damping is calculated by a related variational technique. The time dependence of the echo at a large distance from the cylinder is plotted for two different thicknesses of the cylinder. (Author)

AD-265 870 Div. 8, 25
(TIPTE/DLW) OTS price $7.60

Melpar, Inc., Falls Church, Va.
MOLECULAR CIRCUIT DEVELOPMENT.
Quarterly rept. no. 6, 15 Aug-15 Nov 61,
by S. M. Bryla and C. Feldman. 15 Nov 61, 70p. incl. illus. tables.
(Contract NOw 60-0362-c)
Unclassified report

DESCRIPTORS: (*Electronic circuits, *Thin films, Semiconductors, *Dielectric films, Capacitors, Germanium, Silicon, Vapor plating, Vacuum apparatus, Processing, *Electrical properties, *Dielectric properties, Surface properties, Temperature, Measurement, Design.)

Work on the properties of germanium films consisted of studying details of the deposition techniques. Studies of substrate materials, deposition temperatures, deposition times, and annealing temperatures were made. An examination was made of point contacts which represents the beginning of studies on individual microcrystals in the film. In addition to point contact studies, two other types of measurements were added to the program. These were the determination of the thermal band gap of semiconductor films and the study of reflection spectra of dielectric films. The increased effort in dielectric films resulted in a better understanding of the dielectric properties of thin films and the development of pinhole-free dielectric layers capable of operating to 500 C. (Author)

AD-265 881 Div. 8
(TIPTE/DLW) OTS price $5.60

Electron Physics Lab., U. of Michigan, Ann Arbor.
THEORETICAL AND EXPERIMENTAL INVESTIGATION OF LARGE-SIGNAL TRAVELING-WAVE TUBES.
Quarterly progress rept. no. 4, 1 Apr-1 July 61,
by G. T. Konrad, R. J. Martin and others. July 61, 43p. incl. illus. tables (Rept. no. 03736-8-P)
(Contract AF 30(602)2303, Proj. 5573)
(RADC TN 61-204) Unclassified report

DESCRIPTORS: (*Traveling wave tubes, *Klystrons, Helixes, S band, Ultra high frequency, *Microwave amplifiers, *Electron guns, Space charges, Theory, Design.) (Electron guns, Electron tubes, Amplifiers, Electron beams, Effectiveness, Test sets, Tests.)

Additional one-dimensional calculations on the relativistic traveling-wave tube are presented and the analysis is extended to cover the relativistic klystron. Significant increases in TWA efficiency are noted at high voltages and the longitudinal space-charge debunching forces are reduced in effectiveness. The relativistic klystron behaves according to a ballistic theory due to the reduced space-charge debunching. Experimental data is presented on a variable-pitch helix traveling-wave tube indicating a significant improvement in efficienc,. The gain is also improved and the voltage for maximum small-signal gain is nearly the optimum for highest power output. Initial calculations on a microperveance one electron gun are made using the Poisson cell and trajectory calculator. An analysis of noise transport in linear beam devices is presented and a method for solving the a-c transport equation in a two-dimensional space-charge limited diode is outlined. (Author)

AD-265 900 Div. 8, 14
(TIPTA/DLW) OTS price $2.60

Aeronautical Electronic and Electrical Lab., Naval Air Development Center, Johnsville, Pa.
DEVELOPMENT OF A MULTIFUNCTIONAL ISOLATING BARRIER FOR SHOCK AND VIBRATION.
Final rept. on Phase A and B,
by A. A. Cohen. 17 Oct 61, 25p. incl. illus.
(Rept. no. NADC-EL-6159)
(Proj. TED no. ADC AV-44017)
Unclassified report

DESCRIPTORS: (*Naval aircraft, *Vibration isolators, Airborne, Electronic equipment, Insulating materials, Aluminum alloys, Metal plates, Expanded plastics, Polymers, Urethanes, Design, Tests.) (*Radio communication systems, *Transmitter receivers, Airborne, Aircraft equipment, Shock, Vibration, Reduction.)

An isolation pad was developed to protect aircraft equipment against the combined effects of shock and vibration by cementing flexible polyurethane foam between 2 aluminum alloy plates. The plates were then fastened to the structure and the electronic equipment respectively. Based on the results of the tests performed, it was concluded that the polyurethane foam isolation pad is superior to the standard isolation system presently being used because it protects electronic equipment simultaneously from the effects of vibration and shock. (Author)

Division 8 - ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-265 902 Div. 8, 5
(TIPTE/DLW) OTS price $8.60

Wisconsin U., Madison.
SURFACE WAVE, ANTENNA AND MICROWAVE FILTER ENGINEERING RESEARCH STUDY.
Final rept. 1 Sep 59-31 Aug 61,
by Elmer H. Scheibe. 30 Sep 61, 96p. incl. illus.
(Contract DA 36-039-sc-78326, Proj. 3-99-12-100)
Unclassified report

DESCRIPTORS: (*Waveguides, *Cavity resonators, Electronic circuits, Microwave equipment, Coupling circuits, *Waveguide couplers, *Radiofrequency filters, Design.) (Transmission lines, Microwaves, Impedance, Impedance matching, *Electromagnetic waves, Diffraction, Propagation, Wave transmission, Measurement, Test methods, Test equipment.) (Antennas, Communication equipment, Electromagnetic theory.)

Study of the two stage branching filter showed excellent agreement between predicted performance, calculated from the equivalent circuit used for the design. The original objective of designing microwave filters using the equivalent circuit technique proposed by Goubau was accomplished. A study of the beam waveguide developed by Goubau was started. The very small diffraction loss predicted analytically was verified experimentally. A resonator technique was successful in spite of the resulting high Q's. The radial field distribution in the beam also agreed with analysis. A computer solution for the higher modes on the beam waveguide was obtained. (Author)

AD-265 904 Div. 8
(TIPTP/MFA) OTS price $6.60

Electron Tube Lab., U. of Michigan Ann Arbor.
APPLIED RESEARCH ON CROSSED-FIELD ELECTRON GUNS.
Interim scientific rept. no. 2, 1 July-1 Oct 61,
by J. E. Boers, R. J. Lomax and others. Oct 61. 66p. incl. illus. tables. (Rept. no. 04478 2S)
(Contract AF 33(616)8111)
Unclassified report

DESCRIPTORS: (Design and Analysis of *Electron guns, Electron beams, Particle trajectories, Space charges, Electric currents, Test sets, Magnetic fields, Brillouin zones.) (Analog computers, Digital computers, Programming.) (Equations, Difference equations, Differential equations.) Tables.

Several methods for the design and analysis of crossed-field electron gun systems are discussed and some specific designs are described. The analog computer setup was applied to the Kino gun and particular information on the maximum cathode width tolerable for a laminar flow is given for one design. The variation of space-charge density across the beam is compared with the Brillouin flow condition. The development of crossed-field beam analyzer measuring equipment continued and an analysis is given relative to the measurement of current density components in the beam by procedures similar to the pinhole technique used in axially symmetric systems. Probable errors are analyzed and a design is presented. A digital computer program was completed for the design of any crossed-field gun and the numerical techniques used are discussed. The present computation time of approximately one hour can be reduced by further program optimization. A new analog means for determining gun electrode shapes is presented which is a modification of the method used in the design of axially symmetric systems.

AD-265 933 Div. 8, 6
(TIPTE/RD) OTS price $5.60

Hughes Aircraft Co., Culver City, Calif.
MULTIPLE TARGET RESPONSE OF DATA PROCESSING ANTENNAS,
by M. E. Pedinoff and A. A. Ksienski. 31 May 61, 47p. incl. illus. 11 refs. (Scientific rept. no. 1)
(Contract AF 19(604)8386)
(AFCRL-543) Unclassified report

DESCRIPTORS: (Antennas, *Radar antennas, Numerical analysis, Fourier analysis, Nonlinear systems, Integral transforms.) (Radar signals, *Data processing systems, Radar antennas, Radar reflections, Analysis.) (Radar targets, Detection.)

The response of nonlinear data processing antenna arrays are evaluated for multiple target situations. These situations involve targets of various relative strength and angular separations. The evaluation is carried out both analytically and graphically, and the results obtained are compared to the performance of a linear array. (Author)

AD-265 963 Div. 8
(TIPTE/DLW) OTS price $1.60

Antenna Lab., Ohio State U. Research Foundation, Columbus.
RESEARCH ON ELECTRONIC RECONNAISSANCE ANTENNAS.
Interim engineering rept. 1 June-31 Aug 61,
by J. R. Copeland and W. J. Robertson. 1 Sep 61, 8p. incl. illus. table (Rept. no. 903-22)
(Contract AF 33(616)6211, Proj. 1610-6278)
Unclassified report

DESCRIPTORS: (*Antenna amplifiers, *Parametric amplifiers, Power amplifiers, Electronic circuits, Diodes, Mixer tubes, Phase shifters, Tuning circuits, Negative resistance circuits, Design.) (*Dipole antennas, Radio signals, Radar signals, Interception, Noise (Radio), Signal-to-noise ratio, Radiofrequency power, Measurement.) Antennas.

Power gain and effective noise temperature of an antennafier in which an amplifier is connected to each antenna element are discussed. The derived equations for power gain and effective noise temperature may be used tc select parameters for optimizing the performance of an antennafier. A supergain antennafier array is proposed and some theoretical patterns of supergain arrays are presented. The problem of excitation accuracy is considered briefly. (Author)

AD-265 971 Div. 8
(TIPTE/DLW) OTS price $3.60

Army Signal Research and Development Lab., Fort Monmouth, N. J.
ON ELLIPTICALLY POLARIZED ANTENNAS IN THE PRES-

ENCE OF GROUND,
by Helmut Brueckmann and Donn V. Campbell.
Oct 61, 33p. incl. illus. table (ASRDL Technical rept. no. 2233)
Unclassified report

DESCRIPTORS: (Antennas, *Antenna radiation patterns, Polarization, Electromagnetic waves, *Electromagnetic wave reflections, Electromagnetic fields, Surface area, Phase measurement, Theory, *Communications theory, Mathematical analysis.) (Interference, Measurement.)

The effect of ground reflections upon the far field of an elliptically polarized antenna of arbitrary orientation with respect to ground is investigated. The equation of the polarization ellipse produced by an elliptically polarized antenna in the presence of ground is derived, and several examples illustrate the variation in the axis ratio of the polarization ellipse as a function of the geometry of the measuring setup. A method is presented which permits calculating the phase angle between the direct and the ground reflected component and their amplitude ratio from parameters accessible to measurement. It can be modified to permit separating the effects of the presence of ground from the radiation properties of the antenna itself when these properties are not known and cannot be measured in the absence of ground. (Author)

AD-265 990 Div. 8, 25
(TIPTP/MFA) OTS price $6.60

Cornell U., Ithaca, N. Y.
LOW TEMPERATURE PARAMAGNETIC RELAXATION OF COLOR CENTERS IN KCl.
Doctoral thesis,
by William David Ohlsen. Oct 61, 65p. incl. illus. 31 refs. (Technical rept. no. 6)
(Contract Nonr-401(15)
Unclassified report

DESCRIPTORS: (*Color centers, *Potassium compounds, *Chlorides, *Paramagnetic crystals, Cryogenics, Paramagnetic resonance, Hyperfine structure.) (Electronic equipment, Klystrons, Electric bridges, Crystal detectors, Audiofrequency attenuators, Waveguides, X-ray spectrometers, Relaxation oscillators.) (Experimental data, Equations, Theses, *Bibliography.)

The spin-lattice relaxation of color centers in KCl by use of low temperature paramagnetic resonance was examined by the method of measuring the recovery of the magnetization as a function of the time after saturation. The measurements were made by saturating the resonance at high power and then repeatedly sampling the recovery using low level microwave power. Effects in the paramagnetic resource due to irradiation after heavy optical bleaching were also observed.

AD-266 011 Div. 8, 20
(TIPTE/RD) OTS price $1.60

Edgerton, Germeshausen and Grier, Inc., Boston, Mass.
ANALYSIS OF EXPERIMENTAL RADIATION EFFECTS DATA.
Quarterly progress rept. no. 1, 1 June-31 Aug 61,
by Melville Clark, Jr. 27 Sep 61, 17p. incl. table, 23 refs. (Rept. no. B-2311)
(Contract DA 36-039-sc-87306, Proj. 3A99-21-001)
Unclassified report

DESCRIPTORS: (*Radioactivity, Gamma rays, Neutrons, *Radiation hazards.) (Electronic equipment, *Transistors, Radiofrequency cables, Semiconductors, *Radiation damage, Tests.) (*Radiation effects, Experimental data, Analysis.)

A scheme suitable for the automatic machine analysis of the I sub cbo (reverse leakage current between base and collector with open emitter) data has been devised and is now being coded. A literature search has revealed a method according to which the h sub Fe data (forward current transfer) data should be analyzed and a great deal of related, pertinent data concerning the radiation damage to transistors, both permanent and transient. This material is briefly summarized. The transient effects induced in cables by radiation have been estimated and are believed to be negligible. The distortion of the transistor transients due to reflection of neutrons among the walls is being analyzed. (Author)

AD-266 039 Div. 8
(TIPTW/DLW) OTS price $.75

Naval Research Lab., Washington, D. C.
THERMIONIC ELECTRON SOURCES,
by G. A. Haas. 6 Oct 61, 28p. incl. illus. tables, 103 refs. (NRL rept. no. 5657)
Unclassified report

DESCRIPTORS: (*Thermionic emission, Electrons, Sources, *Cathodes (Electron tubes), Oxide cathodes, Refractory materials, Coatings, Metals, Materials, Physical properties, Electrical properties, Measurement, Work functions.) Electron tubes.

A survey of the emission characteristics of modern thermionic electron sources is presented. In addition to a discussion of recent advances among the more commonly used emitters such as oxide cathodes, thoriated cathodes, and metal cathodes, a tabulation of the thermionic properties of over one hundred various new matrix and refractory-coated cathodes is given. (Author)

AD-266 040 Div. 8
(TIPTE/DLW) OTS price $3.60

Hughes Aircraft Co., Newport Beach, Calif.
HIGH FREQUENCY TRANSISTOR STUDY.
Interim engineering rept. no. 2, 1 July-30 Sep 61,
by Warren P. Waters. 20 Oct 61, 21p. illus. tables.
(Contract NObsr-85296, Proj. SR0080302, ST-9349)
Unclassified report

DESCRIPTORS: (*Transistors, Superhigh frequency, *Transistor amplifiers, Microwave amplifiers, Crystal mixers, Frequency multipliers, Negative resistance circuits, Electronic circuits, Packaged circuits, Packaging, Design.) (Transistors, *Microwave oscillators, Radiofrequency generators, Microwave equipment, *Parametric amplifiers, Signal-to-noise ratio, Tests.) Amplifiers, Oscillators.

This report includes:
Lenkurt Electric Co., San Carlos, Calif.
HIGH FREQUENCY TRANSISTOR STUDY.
Letter progress and Interim engineering rept. 1 July-30 Sep 61. 20 Oct 61, 8p. incl. illus.
(Subcontract to Hughes Aircraft Co., Newport Beach, Calif., Contract NObsr-85296)

A down-converter circuit was developed in which the pump source is obtained by using the transistor in transit-time mode while parametric mixing occurs with mixing gain resulting from a negative conductance produced by the pump frequency. No external feedback is required between the tuned collector and emitter circuits. Using transistor structures in the conventional TO-5 package, a 50 db power conversion gain was obtained with a sensitivity of 1 microvolt and reasonable signal-to-noise ratios. This conversion gain is 15 - 20 db higher than optimum gain for a conventional transistor mixer. (Author)

AD-266 048 Div. 8, 6
(TIPTE/PD) OTS price $2.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
A MECHANICALLY FIXED RADAR ANTENNA WITH SCANNING CAPABILITY,
by L. J. Ricardi, R. N. Assaly and W. C. Danforth, Jr. 16 Oct 61, 26p. incl. illus.
(Rept. no. 315G-2)
(Contract AF 19(604)7400)
(ARPA Order 166-61) Unclassified report

DESCRIPTORS: (*Radar antennas, *Radar scanning, Radar reflectors, *Parabolic antennas, Antenna horns, Feasibility studies.) (Antenna radiation patterns, Wave transmission, Mathematical analysis.)

An antenna system with cylindrical symmetry was analyzed because the 3-dimensional problem reduces to one of two dimensions and simplifies the mathematics. The geometry is shown. The focal length f of the reflector, a parabolic cylinder, and its aperture width 2a were set equal to 30 and 60 lambda respectively. This was illuminated by an array of line sources located in a plane normal to the focal plane of the parabolic cylinder and a distance R from the vertex. Each line source, located a distance sigma from the focal plane, was assumed to be a horn having a radiation pattern in the plane of the parabola given by the gain function g(alpha) = cos sg. alpha. This was chosen because it approximated the pattern of an open ended waveguide. (Author)

AD-266 049 Div. 8
(TIPTE/DLW) OTS price $3.60

Merrimac Research and Development, Inc., Irvington, N. J.
HIGH POWER CIRCULATOR DEVELOPMENT.
Interim development rept. no. 1, 3 May-24 July 61.
28 July 61, 32p. incl. illus.
(Contract NObsr-85329)
Unclassified report

DESCRIPTORS: (*Waveguide couplers, Coupling circuits, *Microwave equipment, S band, Ferrites, Magnets, Design, Feasibility studies.) (Transmission lines, *Ferromagnetic materials, Dielectrics, Tests, Waveguides.)

The development is reported of a very high power circulator operating at S band. The circulator is constructed using the principle of small aperture coupling between an unloaded guide and one which is gyromagnetically loaded, to produce a nonreciprocal coupling leading to circulator action. The operation of the coupler is described and desirable criteria are established for the characteristics of the ferrite loaded guide portion. The ferrite loaded guide characteristics are computed and demonstrate feasibility of operation of the circulator. Construction of the magnet, and test pieces to explore the ferrite mode experimentally are described. A discussion is given of means to achieve high power operation without producing ferrite instability. (Author)

AD-266 073 Div. 8, 1
(TIPTE/CRJ) OTS price $4.60

Narmco Industries, Inc., San Diego, Calif.
ALUMINA RADOME ATTACHMENT.
Quarterly rept. no. 2,
by William L. Bassett, Francis M. Wilson, and Roger A. Long. 20 Oct 61, 37p. incl. illus. tables.
(Contract AF 33(616)8157)
Unclassified report

DESCRIPTORS: (*Radomes, Airborne, *Ceramic materials, *Adhesives, Bonding, Brazing, Tests.) (*Brazing, Refractory materials, Aluminum compounds, Oxides, Molybdenum alloys, Titanium, Zirconium.) (Shear stresses, High temperature research, Materials.) Stresses. (Molybdenum, Ceramic coatings, Coatings of Silicon and Tantalum compounds.)

Braze alloys with flow temperatures ranging up to 3300 F were used to bond radome grade alumina to molybdenum alloy (0.5% Ti - 0.08% Zr). Although strong bonds were obtained, metal embrittlement prevented the testing of the bonds to failure. The greatest shear stress developed in a bondline was 1000 psi without failure. The cause of embrittlement was determined to be primarily chemical reactivity rather than metal recrystallization. Although ceramic adhesive bonds were also prepared, lap shear specimens were not evaluated. These bonds were promising because they did not appear to deteriorate either the metal or the alumina. The choice of protective coatings for molybdenum was narrowed down to a siliconizing coating and a tantalum pentoxide (Ta_2O_5) base ceramic coating. An optimum, nearly stress free mechanical attachment was designed by polariscope analysis techniques. A thorough stress analysis of the ogive attachment design was completed. A magnetic pulse forming method was adapted to the process of attaching the base metal to the radome. (Author)

AD-266 074 Div. 8, 7, 15
(TIPTP/WH) OTS price $13.50

Case Inst. of Tech., Cleveland, Ohio.
DRIVING POINT IMPEDANCE SYNTHESIS USING IMPEDANCE OPERATORS,
by Joseph Bert Murdoch. 1 Aug 61, 187p. incl. illus. 24 refs. (Scientific rept. no. 27)
(Contract AF 19(604)3887)
(AFCRL-747) Unclassified report

DESCRIPTORS: (*Electrical networks, Microwave networks, Circuits, *Impedance, Electrical properties.) (Mathematical analysis, Operators (Mathematics).) Transmission lines, Transformers.

An approach to driving point impedance synthesis is developed, using the concept of an impedance operator, which is general, systematic, flexible and easily applied. The synthesis procedures of Brune, Darlington, Bott-Duffin and Miyata lend themselves to this impedance operator approach. The mathematical properties of the impedance operator are investigated. Specific impedance operators of rank 2, 4 and 6, derived from re-

peated applications of Richards' Theorem and extension thereof, are examined. Through these operators 13 realizable network sections containing one or more arbitrary constants may always be removed from a prf driving point impedance function leaving, in cascade, a terminating impedance which is realizable and contains the same arbitrary constants. Using the impedance operator approach, three cascade synthesis procedures are developed. The first is an extension of the Bott-Duffin procedure. The second is a general reciprocal synthesis procedure applicable to any prf driving poing impedance. The third is a general non-reciprocal synthesis procedure not requiring transformers. (Author)

AD-266 081 Div. 8, 25
(TIPTP/WH) OTS price $5.60

Antenna Lab., Ohio State U. Research Foundation, Columbus.
PROPAGATION IN TRANSVERSELY MAGNETIZED PLASMA BETWEEN TWO CONDUCTING PARALLEL PLANES.
Rept. on Investigation of Ion Sheath Research, by H. Unz. 15 Oct 61, 53p. 152 refs. (Rept. no. 1021-9)
(Contract AF 33(616)6782)
Unclassified report

DESCRIPTORS: (*Electromagnetic waves, Propagation, *Waveguides, Magnetic fields, *Ferrites, Plasma physics.) (Mathematical analysis, Tensor analysis, Vector analysis, Determinants.)

An operational calculus method for the solution of anisotropic media boundary-value problems is discussed in general. A six-by-six determinantal equation is found for the propagation constant. Transformation relations between transversely magnetized ferrites and plasma are given and the invariancy of the boundary conditions is pointed out. The propagation constant for the case of transversely magnetized ferrite or plasma is found for the rectangular waveguide in terms of two parameters which should be determined from the boundary conditions. The electromagnetic field in transversely magnetized ferrites between two perfectly conducting parallel planes is found and compared with existing solutions. Using the above transformation relations, the electromagnetic fields in transversely magnetized plasma between two perfectly conducting parallel planes is given in detail. It is shown that the TEno mode is also a rectangular waveguide mode for the plasma case. (Author)

AD-266 089 Div. 8, 26
(TIPTE/DLW) OTS price $2.60

Pacific Semiconductors, Inc., Lawndale, Calif.
PRODUCTION ENGINEERING MEASURE TRANSISTOR, VHF, SILICON, POWER (5W-70MC).
Quarterly rept. no. 1, 1 June-31 Aug 61, by B. D. Gray, H. Hontz, and others. 31 Aug 61, 22p. incl. illus. (PSI rept. no. TE 4000:15-Q-1)
(Contract DA 36-039-sc-85960)
Unclassified report

DESCRIPTORS: (*Transistors, *Transistor amplifiers, Power amplifiers, Very high frequency, *Radiofrequency oscillators, Silicon, Design, Production, Processing, *Manufacturing methods, Packaging, Tests.) Semiconductors.

Investigations are concerned with the establishment of a limited production facility for the fabrication of 70 mc, 5 watt transistors. Device design, process refinement, and package design were studied. Suitable progress was made in these areas and a device design with an annular configuration and planar structure was developed. A preliminary package was obtained for the fabrication of the initial engineering samples. (Author)

AD-266 092 Div. 8, 26
(TIPTE/CRJ) OTS price $2.60

Lansdale Div., Philco Corp., Pa.
PEM FOR ELECTROCHEMICALLY ETCHED TRANSISTORS 2N495 AND 2N496.
Quarterly progress rept. no. 1, 19 May-19 Aug 61, by D. Weisel and J. Biscoe. 19 Aug 61, 19p. incl. illus.
(Contract DA 36-039-sc-85959)
Unclassified report

DESCRIPTORS: (*Transistors, Manufacturing methods, Production.) (Silicon, *Single crystals, Electrodes, Electroplating, Attachment, Soldering.)

Efforts are being made to design, construct, and prove-in semi-automatic production equipment for lead preparation and attachment to silicon dice. The equipment shall be limited to one prototype machine capable of producing parts directed toward a rate of at least 600 transistors meeting the applicable specifications per eight hour day. The experimental work required on the soldering techniques is 60% complete. The experimental work on the whisker and transistors servo positioning systems is 25% complete and is, at present, a primary task. Mechanical design is 25% through assembly layouts. (Author)

9. FLUID MECHANICS

AD-265 510 Div. 9
(TIPTP/MFA) OTS price $9.10

Northwestern U., Evanston, Ill.
THE EFFECT OF RECOMBINATION RATE ON THE FLOW OF A DISSOCIATING DIATOMIC GAS,
by Thomas P. Anderson. Sep 61, 105p, incl. illus.
(Contract AF 40(600)748)
(AEDC TR 61-12) Unclassified report

DESCRIPTORS: (*Recombination reactions, *Dissociation, Ionization, *Gas flow, Hypersonic nozzles, Shock waves, Thermodynamics, Enthalpy, Molecules, Atoms, Energy.) (Numerical analysis, Number theory, Probability, Complex variables, Differential equations.) (Analog computers, Programming, Bibliography.)

The flow of a chemically reacting gas through a divergent nozzle is considered. A pure diatomic gas is assumed to dissociate and recombine according to seven distinct recombination

rate laws. The effect of correcting Lighthill's ideal dissociating gas for vibrational contributions of the molecular species and translational contributions of the atomic species is shown to be small. The effect of recombination rate on the flow of oxygen, from throat conditions of 2 atm and 4050 K, is shown to be significant for reaction rates decreasing with temperature and relatively unimportant for reaction rates increasing with temperature. Electronic analog computer solutions are presented for a variety of throat compositions and recombination rates. (Author)

AD-265 547 Div. 9, 30
(TIPTP/MFA) OTS price $2.60

Institute of Aerophysics, U. of Toronto (Canada).
PRESSURE PROBES IN FREE MOLECULE FLOW,
by K. H. Enkenhus, E. L. Harris, and G. N. Patterson. July 61, 13p. illus. 12 refs. (UTIA review no. 19)
(Contract AF 49(638)281)
Unclassified report

DESCRIPTORS: (Pressure, Pitot tubes, *Superaerodynamics, Gas flow, Velocity, Orifices, Sheets, Wind tunnel models, Kinetic theory, Gas diffusion, Experimental data, Statistical functions.)

When the mean free path becomes a significant fraction of a characteristic dimension of a pressure probe, the usual continuum formulae relating the measured pressure to the free-stream pressure and Mach number are no longer valid. The case where the mean free path is so large compared with the probe diameter that intermolecular collisions may be neglected is treated. This is the condition for free molecule flow. Theoretical expressions are given for the pressure measured in a flowing gas with an orifice probe and a long-tube pressure probe. Experimental investigations were conducted using a low-density wind tunnel and a rotating-arm apparatus. Agreement between theory and experiment was quite satisfactory. Although this work was done primarily in connection with the flow of low density gases over models in the laboratory, the results are equally applicable to situations encountered in upper atmospheric research. (Author)

AD-265 559 Div. 9, 30
(TIPTW/JRG) OTS price $1.60

Naval Ordnance Lab., White Oak, Md.
THE DEVELOPMENT OF AN EXPLOSIVE HIGH-PRESSURE RELEASE,
by Rayner A. Montgomery and E. Eugene Kilmer. 1 Aug 61, 20p. incl. illus. table (Ballistics Research rept. no. 37)
(NAVWEPS rept. no. 7327)
Unclassified report

DESCRIPTORS: (*Explosives, *Sheets, *Diaphragms (Mechanics), Shock tubes, Gases, Pressure, *Hypersonic flow, Tests.) (Shock waves, High speed photography.) (Re-entry aerodynamics, Test facilities.)

An experimental investigation was conducted to determine the feasibility of using explosives as a diaphragm for sudden release of high-pressure gas. From the tests, it appears that the use of a sheet explosive as an explosive membrane will satisfy the conditions of extremely fast action (in the order of microsec), absence of solid fragments, and a complete opening allowing unrestricted gas flow. Diaphragms of 1.5-in. diam were tested by releasing gas pressures up to 750 psi. Although the contemplated use is that of a muzzle diaphragm to release the working gas in a hypersonic shock tunnel, this type of pressure release may be adaptable to other applications. (Author)

AD-265 576 Div. 9, 25
(TIPTP/MFA) OTS price $2.60

AVCO Research Lab., Everett, Mass.
A SURVEY OF SHOCK TUBE RESEARCH RELATED TO THE AEROPHYSICS PROBLEM OF HYPERSONIC FLIGHT,
by S. C. Lin. July 61, 18p. incl. illus. 58 refs. (Rept. no. AMP 63)
(Contract AF 19(604)7458)
(AFCRL-700) Unclassified report

Presented at American Rocket Society, Air Force Office of Scientific Research, International Hypersonic Conference, Massachusetts Institute of Technology, Aug 61.

DESCRIPTORS: (*Shock tubes, Aerodynamics, Plasma physics, Gas flow, Shock waves, *Hypersonics, Thermodynamics, Entropy.) (Literature, Bibliography.)

'In recent years, a considerable volume of research was undertaken in the field of high temperature gas dynamics in which the shock tube was employed as the principal experimental tool. In particular, a substantial fraction of this research effort was devoted to the study of phenomena peculiar to air and its component gases, and is, therefore, directly applicable to many aerophysics problems associated with hypersonic flight through the Earth's atmosphere. However, in spite of their omniexistence, most of these works were published over a period of time in a scattered manner, and hence, appear to be somewhat incoherent. A preliminary effort is made to compile these published works under various identifiable (if somewhat arbitrary) topics so as to provide a more convenient reference for investigators in this field. Whenever possible, the advantages and limitations of the shock tube as a research tool for tackling the various topics of interest are also pointed out. (Author)

AD-265 594 Div. 9, 30
(TIPTA/WAW) OTS price $.75

National Aeronautics and Space Administration, Washington, D. C.
WIND-TUNNEL TESTS OF SEVEN STATIC-PRESSURE PROBES AT TRANSONIC SPEEDS,
by Francis J. Capone. Nov 61, 30p. incl. illus. (NASA Technical note D-947)
Unclassified report

Also available from NASA, Wash. 25, D. C., as NASA Technical note D-947.

DESCRIPTORS: Wind tunnels, *Transonic wind tunnels, Instrumentation, Pressure, Measurement, *Pitot tubes, Aerodynamics, Transonics, Errors, Tests, Bodies of revolution, Conical bodies, Aerodynamic configurations, Model tests, Wind tunnel models.

Wind-tunnel tests were conducted to determine the

errors of seven static-pressure probes mounted very close to the nose of a body of revolution simulating a missile forebody. The tests were conducted at Mach numbers from 0.80 to 1.08 and at angles of attack from -1.7 to 8.4 degrees. The test Reynolds number per foot varied from 3.35 to 4.05 times 10 to the 6th power. For three 4-vane, gimbaled probes, the static-pressure errors remained constant throughout the test angle-of-attack range for all Mach numbers except 1.02. For two single-vane, self-rotating probes having two orifices at plus or minus degrees from the plane of symmetry on the lower surface of the probe body, the static-pressure error varied as much as 1.5 percent of free-stream static pressure through the test angle-of-attack range for all Mach numbers. For two fixed, cone-cylinder probes of short length and large diameter, the static-pressure error varied over the test angle-of-attack range at constant Mach numbers as much as 8 to 10 percent of free-stream static pressure. (Author)

AD-265 613 Div. 9
(TIPTP/MFA) OTS price $1.10

Aerospace Corp., El Segundo, Calif.
NOTE ON THE DAMPING OF FREE-SURFACE OSCILLATIONS DUE TO DRAINAGE,
by John W. Miles. 14 Sep 61, 5p. (Rept. no. TDR-930(2270-20)TN-1)
(Contract AF 04(647)930)
Unclassified report

DESCRIPTORS: (*Damping of *Oscillation due to *Drainage from Tanks.) (Linear systems, Motion, Equations, Integral equations, Matrix algebra.)

It is shown that the draining of liquid from a vertical tank produces a small but positive damping of free-surface oscillations. This conclusion is consistent with the experimental observations of Rainey. (Author)

AD-265 633 Div. 9, 1
(TIPTP/JW) OTS price $9.60

General Dynamics/Convair, San Diego, Calif.
WIND TUNNEL BOUNDARY LAYER CONTROL RESEARCH ON A HIGH WING, PROPELLER DRIVEN FLYING BOAT WITH AN ALL-BLOWING AND A COMBINED SUCTION-BLOWING BOUNDARY LAYER CONTROL SYSTEM.
Final analysis rept.,
by G. F. Deering, B. G. Mullis, and G. W. Schwartz. 16 May 60, 118p. incl. illus.
(Rept. no. ZA-312)
(Contract NOa(s) 58-753-c)
Unclassified report

DESCRIPTORS: (*Flying boats, *Boundary layer control, *Wing-body configurations, Blowers, Turbulent flow.) (Aerodynamics, Lift, Drag.) (Wind tunnels, Tests.)

Analysis of wind tunnel test results on a high wing propeller driven flying boat with flap boundary layer control has shown that more efficient lift augmentation is obtained with a combined suction/blowing flap boundary layer control concept in comparison to an all blowing concept. This comparison is based on the same expenditure of horsepower to overcome BLC slot losses. Employment of the combined power-matched concept on the test model gave trimmed maximum lift values with high propeller thrust. Higher values could have been achieved if more suction flow quantity had been available. Attachment of the flap upper surface flow, through BLC, extended (L/D)max to a much wider lift range than without BLC. Limited tests of several flap/slot arrangements showed that the BLC flow quantities required to attach the flap upper surface were not sensitive to BLC slot or flap geometry. A powerful adverse ground effect phenomenon developed at high lifts near the ground. This effect reduced the maximum lift attainable and increased the drag. It is not known how applicable these results are to full scale, since the wind tunnel ground board boundary layer is not representative of full scale. (Author)

AD-265 726 Div. 9
(TIPTP/MFA) OTS price $1.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
INVESTIGATION OF THE TURBULENT CHARACTERISTICS OF A FREE ANISOTHERMAL STREAM AND OPEN FLAME TONGUE,
by G. S. Antonova. 19 Oct 61, 18p. incl. illus.
(Trans. no. MCL-1330 of Trudy Soveschaniya Po Prikladnoy Gazovoy Dinamike Alma-Ata, pp. 45-54, 23-26 Oct 56)
Unclassified report

DESCRIPTORS: (*Turbulent flow, Hydrodynamics, *Gas flow, Flames, Boundary layer, Vibration.) (Laboratory equipment, Oscillographs, Vacuum tube amplifiers, Benzenes, Anemometers, Thermocouples, Electric bridges.) (Equations, Experimental data.)

Contemporary hydrodynamics of a turbulent flow directs its main efforts to an experimental study of turbulence in order to accumulate experimental information permitting us to develop, sooner or later, a reliable theory of turbulence. According to modern concepts of turbulence, any physical magnitude at any point of a quasi-stationary turbulent flow can be represented as consisting of a time-averaged and a pulsation magnitude. Our purpose was to investigate the pulsating quantities in a free anisothermal stream and an open flame tongue. (Author)

AD-265 730 Div. 9
(TIPTP/TL) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
GAS EQUILIBRIUM BEHIND THE SHOCK WAVE IN OXYGEN, NITROGEN AND THEIR MIXTURES AND XENON,
by S. A. Losev. 23 Oct 61, 8p. incl. illus. tables (Trans. no. MCL-1347 of Vestnik Moskovskovo Universiteta, Seriya III, Fizika, Astronomiya 5:47-52, 1960)
Unclassified report

DESCRIPTORS: (*Gases, *Oxygen, *Nitrogen, *Xenon, Shock waves.) (Pipes, Temperature, Propagation, Dissociation, Low pressure research, Thermodynamics, *Gas flow, Pressure, Density, Enthalpy, Heat, Atoms, Gas ionization, Electrons.) (Computers, Tables.)

The calculation of the values of the thermodynamic parameters of a gas behind a direct shock wave in O2, N2 and their mixtures with Xe, assuming instantaneous establishment of equilibrium, is given. The calculations were made on a high-speed electronic computer. It is shown that the addition of xenon to oxygen and nitrogen noticeably raises the temperature and the degree of dissociation of the molecular components of the mixture. (Author)

Division 9 - FLUID MECHANICS

AD-265 747 Div. 9
(TIPTP/MFA) OTS price $2.60

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
ON THE VISCOSITY OF DISSOCIATED AIR,
by F. K. Moore. Sep 61, 12p. illus. (Rept. no. RM-1396-A-2)
(Contract AF 49(638)793)
(AFOSR-1554)
Unclassified report

DESCRIPTORS: (Air, *Dissociation, *Viscosity, *Superaerodynamics, Kinetic theory, Gas ionization, Molecules, Atoms, Elastic scattering, Transport properties.) (Equations, Perturbation theory.)

Using a particular set of interaction parameters, it is shown that the viscosity of dissociated high-temperature air is well represented by a simple formula which is a perturbation from the pure-molecule result. To this order, information about atom-atom interactions is not needed. The perturbation formula is then used to show that there is no point in calculating the effect of composition on viscosity unless the atom-molecule interaction parameters are known within a very few per cent. Finally, it is noted that the composition effect on boundary-layer transport properties stems chiefly from the dilatation factor in the state equation, tending to justify calculation of viscosity on a pure-molecule basis. (Author)

AD-265 762 Div. 9,
(TIPTP/MFA) OTS price $5.60

Radiation Lab., Johns Hopkins U., Baltimore, Md.
INSTABILITIES AND NOISE IN MAGNETICALLY CONFINED PLASMAS.
Final rept. for period ending 31 Aug 61,
by M. Scotto, D. Denburg, and P. Parzen.
31 Aug 61, 48p. incl. illus.
(Contract AF 19(604)5468)
Unclassified report

DESCRIPTORS: (Stability and *Noise in *Magnetic pinch, *Plasma physics, Gas discharges, Wave transmission.) (Theory of Ballistics, Equations, Bessel functions, Numerical analysis, Integrals.) (Instrumentation, Oscilloscopes, Pulse generators, Discriminators, Discharge tubes, Wiring diagrams.)

Large amounts of noise power were observed in a coaxial line coupled to a magnetically self-confined plasma. The noise power lies in the megacycle frequency range, and has a power density of the order of 50 db/kT. To account for this, a theory is developed based on the inherent instabilities in the plasma, which are characterized by the propagation of initial disturbances in the form of growing waves. The mode of propagation depends on the transverse movement of the surface of the plasma, and is affected slightly by any action in the interior of the discharge. This type of propagation is similar to the scalloping modes in microwave tubes except for the presence of positive ions which are lacking in most microwave devices. The frequency at which the maximum growth occurs is determined by the gyro and plasma frequencies of the positive ions. (Author)

AD-265 771 Div. 9
(TIPTP/TL) OTS price $4.60

Aerophysics Lab., Mass. Inst. of Tech., Cambridge.
AN INTEGRAL METHOD FOR LAMINAN BOUNDANY LAYER CALCULATIONS: MOMENTUM THICKNESS AND MASS TRANSFER WITH ZERO PRESSURE GRADIENT,
by F. E. C. Culick. July 61, 45p. incl. illus. 17 refs. (Technical rept. no. 10)
(Contract AF 49(638)245)
(AFOSR-1411) Unclassified report

DESCRIPTORS: (*Boundary layer, *Laminar boundary layer, *Sheets, Surfaces, Gases, Gasflow, *Helium, Wedges.) (Analysis, Heat transfer, Energy, Pressure, Velocity, Thickness, Transport properties, Sweat cooling.) (*Compressible flow, Temperature, Injection.) (*Integral equations, Partial differential equations, Differential equations, Equations.)

Work by Rott and Crabtree and by Hill is the basis of an integral method solution to the equation for the concentration of species in the binary mixture boundary layer. The principal result is a relatively simple integral relationship between wall concentration and surface mass transfer rate for arbitrary mass transfer distributions. Only the case of helium injection into an undissociated airstream, with zero pressure gradient, is treated in detail but the method can be applied to problems involving other gases. The results agree quite well with exact similarity solutions and with numerical results for the problem of a solid leading edge followed by a porous region. Solution to the upstream-mass-transfer-problem is also obtained easily. (Author)

AD-265 789 Div. 9, 1
(TIPTA/WAW) OTS price $12.50

North American Aviation, Inc., Columbus, Ohio.
AN EVALUATION OF AN ANALYTICAL TECHNIQUE FOR THE PREDICTION OF THE SPIN AND SPIN RECOVERY CHARACTERISTICS OF A CONTEMPORARY AIRPLANE,
by R. H. Hanna. 15 Feb 61, 173p. incl. illus. tables (Rept. no. NA 61H-37)
(Contract NOw 60-355d)
Unclassified report

DESCRIPTORS: (*Attack bombers, *Jet planes, *Naval aircraft, *Spin, Recovery, Mathematical analysis, Stability, Supersonic planes.) Control, Aerodynamics.

The evaluation of an analytical method for the prediction of spin and spin recovery characteristics of a contemporary airplane is described. The spin characteristics of an airplane can be accurately determined through the use of static wind tunnel data and estimated rotary and damping derivations based on static wind tunnel data. (Author)

AD-265 805 Div. 9
(TIPTM/EJH) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CALCULATING THE TEMPERATURE FIELDS IN AN INSUFFICIENTLY HEATED LIQUID UPON BOILING UNDER

CONDITIONS OF FREE CONVECTION,
by L. A. Latyshev. 16 Oct 61, 9p. incl. illus. (Trans. no. FTD-TT-61-51 of Izvestiya Vysshikh Uchebnykh Zavedeniy, Aviatsionnaya Tekhnika 3:74-79, 1960)
Unclassified report

DESCRIPTORS: (*Liquids, Heating, *Boiling, Convection, Turbulence, Hydrodynamics, Fluid mechanics, Heat transfer, Thermodynamics, Temperature.) Ethanols, Mathematical analysis, Test methods, USSR, Technological intelligence, Translations.

AD-265 813 Div. 9, 25
(TIPTP/WH) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE PROBLEM OF ONE DIMENSIONAL NONSTEADY GAS FLOW IN THE GENERAL THEORY OF RELATIVITY, TAKING DISSIPATIVE PROCESSES INTO ACCOUNT,
by T. Aytmurzayev. 23 Oct 61, 9p. (Trans. no. FTD-TT-61-118 of Izvestiya Vysshikh Uchebnykh Zavedeniy, Fizika 6:13-19, 1060)
Unclassified report

DESCRIPTORS: (*Gas flow, *Relativity theory, Taylor's series, Viscosity, Thermal conductivity, Differential equations.) (Translations, USSR.)

The following problem is investigated, assuming that the initial line in space is a parabola. Two cases are treated under these assumptions; when the speed of light is considered to be unity in the center of mass for all times; and when the speed of light is arbitrarily given along the initial line (the Cauchy problem). The problem is solved using the power-series method. (Author)

AD-265 860 Div. 9
(TIPTP/TL) OTS price $3.60

Grumman Aircraft Engineering Corp., Bethpage, N. Y.
SHOCK IMPINGEMENT ON A CONSTRICTION,
by Solomon Ciolkowski. Nov 61, 32p. incl. illus. (Research rept. no. RE-150)
Unclassified report

DESCRIPTORS: (*Shock waves, *Shock tubes, *Impact shock, *Fluid mechanics, *Gases, Gas flow, Reflection, Fluid flow.) (Physical properties, Reflection, Energy, Velocity, Density, Thermodynamics, Mach number.) Orifices. (Computers, Equations, Mathematical analysis.)

A study is presented of an ideal gas shock impinging on a wall. The flow produced by a shock moving in a tube with a constriction is analyzed. The analysis is then applied to the solution of the shock impingement on a constriction. The state of the gas produced by the interaction of a shock with a constriction is determined for the case where the shock is reflected. Contraction ratios are determined so that the shock is reflected. The interaction of a shock with an interface is studied and conditions are determined so that a reflected shock is not produced. In the last section methods are proposed which can be used to analyze the above situations for real gases in thermodynamic equilibrium. (Author)

AD-265 867 Div. 9
(TIPTP/MFA) OTS price $2.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
APPLICATION OF THE RESONANT CAVITY METHOD TO THE MEASUREMENT OF ELECTRON DENSITIES AND COLLISION FREQUENCIES IN THE WAKES OF HYPERVELOCITY PELLETS,
by M. Labitt and M. A. Herlin. 17 Oct 61, 18p. incl. illus. (Technical rept. 248)
(Contract AF 19(604)7400)
(ARPA Order no. 13-61)
Unclassified report

DESCRIPTORS: (Cavity resonators, *Gas ionization, *Cavitation in Wake of Pellets, Plasma physics.) (Instrumentation, Signal generators, Oscilloscopes, Phase detectors, Waveguides.) (Perturbation theory, Equations.)

The use of the resonant cavity method for measuring electron densities and collision frequencies in the ionized wakes of hypervelocity pellets is described. The equivalent circuit obtained from a normal mode analysis of the cavity fields and their interaction with the wake plasma is used to determine the plasma parameters in terms of measurable properties of the cavity. The range of validity of the method is discussed, along with a sensitivity and accuracy analysis. (Author)

AD-265 872 Div. 9
(TIPTP/MFA) OTS price $6.60

Michigan U. Coll. of Engineering, Ann Arbor.
JET INTERFERENCE EXPERIMENTS EMPLOYING BODY-ALONE AND BODY-FIN CONFIGURATIONS AT SUPERSONIC SPEEDS.
by Gerald F. Carvalho and Paul B. Hays. Dec 60, 54p. incl. illus. (Rept. no. 03942-7-T; Rept. no. CM-979)
(Contract NOrd-16595)
Unclassified report

DESCRIPTORS: (Satellite vehicles, Wind tunnel models, *Aerodynamic configurations, *Supersonics, Shock waves, Cylindrical bodies, Bodies of revolution, Supersonic nozzles, Ogives, Orifices, Sheets, Pipes.) (Tests, Experimental data.) (Laboratory equipment, Electric bridges, Oscillographs, Amplifiers, Potentiometers.)

An experimental investigation of the side-jet, supersonic stream interaction phenomena has shown that beneficial interaction forces can be obtained on a body of revolution with or without fins. The magnitude of the interaction forces obtained on a body of revolution with fins can exceed the jet static thrust, while the magnitude of the interaction forces obtained on a body of revolution without fins is much less. This investigation has also shown that some of the important parameters governing the magnitude of the interaction force obtained on a body of revolution are fin-exposed semi-span, side-jet nozzle geometry, and side-jet nozzle location. (Author)

AD-265 878 Div. 9
(TIPTP/MFA) OTS price $2.60

Massachusetts Inst. of Tech., Div. of Sponsored Research, Cambridge.
RECOVERY FACTORS FOR AND HEAT-TRANSFER COEFFI-

CIENTS TO AIR FLOWING IN A TUBE AT SUPERSONIC VELOCITY.
Final rept.,
by George A. Brown. Sep 61, 21p.
(Contract N5ori-07897)
Unclassified report

DESCRIPTORS: (*Heat transfer, *Fluid flow, Pipes, *Supersonics, Thermal conductivity, Boundary layer, Adiabatic gas flow.) (Laboratory equipment, Supersonic nozzles, Tanks, Plastic tubing, Rods, Vacuum apparatus.) Bibliography, Theses.

An experimental and analytical study was conducted on the flow of air in the entrance region of a tube for inlet Mach numbers of about 3.0 and 5.0. It was found that a laminar boundary layer exists on the walls of the tube for some distance downstream of the tube inlet with an isentropic core of fluid located outside the boundary layer region and around the tube centerline. The laminar boundary layer develops along the tube until length Reynolds numbers are reached which permit transition to a turbulent boundary layer. The isentropic core of fluid exists after transition has taken place and until the turbulent boundary layer fills the entire cross sectional area of the tube. As the inlet diameter Reynolds number was increased, the distance between the tube inlet and the point of transition decreased. This flow model was verified for inlet Mach numbers up to about 5.0 and for inlet diameter Reynolds numbers up to about 10 to the 6th power. (Author)

AD-265 879 Div. 9, 12
(TIPTW/WAW) OTS price $1.10

Midwest Research Inst., Kansas City, Mo.
SUPERSONIC FLUTTER OF MISSILES WITH FLEXIBLE BODIES.
Bimonthly progress rept. no. 2, 8 June-8 Aug 60,
by Edmond F. E. Zeijdel. 16 Aug 60, 3p. incl. illus.
(Contract NOw 60-0726-c)
Unclassified report

DESCRIPTORS: *Guided missiles, *Flutter, Mathematical analysis, Differential equations, Partial differential equations, *Supersonics, Aerodynamics, Wings.

AD-265 880 Div. 9, 12
(TIPTW/WAW) OTS price $1.10

Midwest Research Inst., Kansas City, Mo.
SUPERSONIC FLUTTER OF MISSILES WITH FLEXIBLE BODIES.
Bimonthly progress rept. no. 1, 8 Apr-8 June 60,
by Edmond F. E. Zeijdel. 11 July 60, 3p.
(Contract NOw 60-0726-c; Continuation of Contract NOa(s) 59-6135-c)
Unclassified report

DESCRIPTORS: (*Guided missiles, *Flutter, Mathematical analysis, Differential equations, Partial differential equations, *Supersonics, Aerodynamics, Wings.)

The primary objective of this research program is to determine the unsteady aerodynamic forces on slender supersonic missiles. The unsteady aerodynamic forces will be determined on the basis of quasi-slender body theory and particular emphasis will be placed on the case of wing bending. This work is a continuation of work completed under BuAer Contract NOas 59-6135-c (AD-242 907). During this report period, initial efforts were made to give an example which illustrates the theory developed under the previous contract. (Author)

AD-265 887 Div. 9
(TIPTP/MFA) OTS price $1.50

National Aeronautics and Space Administration, Washington, D. C.
LOW SUBSONIC PRESSURE DISTRIBUTIONS ON THREE RIGID WINGS SIMULATING PARAGLIDERS WITH VARIED CANOPY CURVATURE AND LEADING-EDGE SWEEP,
by Paul G. Fournier and B. Ann Bell. Nov 61, 51p. incl. illus. (NASA Technical note no. D-983)
Unclassified report

Also available from NASA, Wash. 25, D. C., as NASA Technical note no. D-983.

DESCRIPTORS: (*Subsonic flow, Pressure, Triangular wings, *All-wing gliders, Transonic wind tunnels, Airplane models, Curved profiles.) (Experimental data, Photographs, Design.)

An investigation was made in the Langley 7- by 10-foot transonic tunnel to determine the subsonic pressure distribution of three paraglider models through an angle-of-attack range from 0 to 74 degrees. Three rigid metal models simulated a 45 degrees basic flat planform paraglider with leading-edge sweep angles of 61.6, 52.5 and 48.6 degrees. These configurations resulted in one-half-circle, one-third-circle, and one-quarter-circle semispan trailing-edge curvature when viewed from downstream. The results are presented as curves of chordwise pressure distributions at four spanwise locations. (Author)

AD-265 948 Div. 9, 4, 25
(TIPTP/WH) OTS price $6.60

AVCO Research Lab., Everett, Mass.
RATE OF IONIZATION BEHIND SHOCK WAVES IN AIR. I. EXPERIMENTAL RESULTS,
by S. C. Lin, R. A. Neal, and W. I. Fyfe. Sep 60, 63p. incl. illus. (Research rept. no. 105; Supersedes Research note 210, AD-321 537)
(Contracts AF 04(647)278 and DA 19-020-ORD-4862)
(AFBMD TR 60-216) Unclassified report

DESCRIPTORS: (*Hypersonics, Superaerodynamics, Gas flow, *Shock waves, *Plasma physics.) (Shock tubes, Shock waves, Electrons, Density, Detectors.)

Extremely fast rates observed at normal air densities, keep the electron density profile behind strong shock waves beyond the spatial resolution of most ionization detectors that can be used for quantitative measurements. This difficulty is removed through the use of a 24-inch diam., low-density shock tube, which allows experiments to be performed at densities lower than the ordinary shock tube operating density by a factor of 100. By using such a shock tube, together with microwave reflection and magnetic induction probes, the electron density profile behind normal shock waves in air at initial pressures between 0.02 and 0.2 mm Hg and in the velocity range of 15,000 to 23,000 ft/sec has been experimentally determined. It was found

that the electron density rises rapidly behind the shock front without much incubation to a transient peak value which is considerably higher than that corresponding to the final equilibrium value. At a shock velocity of 23,000 ft/sec, the distance required to reach 90% of the transient peak electron density was found to be only about 10 times the viscosity mean free path of the undisturbed gas ahead of the shock. At a shock velocity of 15,000 ft/sec, the corresponding distance was found to be approximately 50 times the initial mean free path. (Author)

AD-265 987 Div. 9, 15
(TIPTP/MFA) OTS price $3.60

Institute of Engineering Research, U. of Calif., Berkeley.
THE FLOW OF TWO ADJACENT PLANE SUPERSONIC JETS PAST FLAT PLATE WINGS, IV. CALCULATIONS WITH SUBSONIC LEADING EDGES ON THE STARBOARD SIDE,
by M. Holt and S. C. Lee. Oct 61, 1v. incl. illus. tables (Series no. 177, Issue no. 4)
(Contract Nonr-22279)
Unclassified report

DESCRIPTORS: (*Supersonic flow, Triangular wings, *Subsonic flow, Jet planes, *Pressure.) (Mathematical analysis, Equations, Transformations (Mathematics), Integration, Complex variables.) (Experimentation, Tables.)

Using the general formulae derived earlier (Quart. J. Mech. Appl. Math. IV; 4:419-431, 51) further surface pressure distributions are calculated on delta wings placed in two adjacent uniform supersonic jets. Five cases are considered when the port jet leading edge lies outside and the starboard leading edge lies inside the respective Mach semi-cones. (Author)

AD-266 029 Div. 9, 15
(TIPTP/MFA) OTS price $3.60

General Electric Co., Burlington, Vt.
STUDY OF PARAMETERS WHICH AFFECT PELLET FLOW TYPE ACCELEROMETERS.
Monthly progress rept. no. 5, 1-31 Oct 60, by William Nicolini, 15 Nov 60, 33p. incl. illus. tables (Rept. no. 61 APB 778-5)
(Contract DA 36-034-ORD-3230)
Unclassified report

DESCRIPTORS: (*Pellets, Metals, Tungsten, Nickel alloys, Chromium, Aluminum, Copper, Stainless steel, Glass, *Accelerometers, Gravity, Physical properties.) (Mathematical analysis, Spheres, Experimental data, Photographic analysis, Tables.) (Equations, Motion.)

A mathematical approach to correlation of experimental results on pellet flow is presented which compares the actual closure time for an actual accelerometer to the theoretical closure time for an ideal accelerometer. As part of this approach a study is presented, and formulas derived, for the packing of spheres into annular and cylindrical cross sections. (Author)

AD-266 038 Div. 9, 25
(TIPTP/JD) OTS price $5.60

California U., Berkeley.
THE EIKONAL METHOD IN MAGNETOHYDRODYNAMICS,
by Steven Weinberg. Sep 61, 59p.
(Contracts AF 49(638)327 and Nonr-22260, Proj. NR 041-221)
(AFOSR-1546)
Unclassified report

DESCRIPTORS: (*Magnetohydrodynamics, *Electromagnetic waves, Propagation, Ionospheric disturbances, Quantum mechanics.) (Shock waves, Propagation, Perturbation theory, Vector analysis, *Plasma physics.)

The eikonal method is extended to waves with several components propagating in inhomogeneous anisotropic media. Formulas are derived for the motion of wave packets, the change in amplitude along a ray path, and the corrections due to diffraction. The method is applied to pure magnetohydrodynamic disturbances, and the problem of computing ray paths in the ionosphere is discussed. One result is that the fraction of the energy of an isotropic disturbance that eventually gets as low as 200 km drops from .99 at 200 km to .2 at 450 km, rises again to .99 at 700 km, drops to .5 at 3000 km and continues dropping at greater altitudes. Energy trapped between 200 km and 700 km oscillates around 450 km with period 8.5 sec (at the geomagnetic equator). The eikonal method is also applied to a very general problem involving coupled magnetohydrodynamic, electrodynamic, and acoustic modes. (Author)

AD-266 067 Div. 9, 1
(TIPTA/CRJ) OTS price $2.60

Aeronautical Structures Lab., Naval Air Material Center, Philadelphia, Pa.
STUDY OF METHODS FOR PERFORMING INFLIGHT MEASUREMENTS OF ACOUSTIC NOISE,
by Frank F. Borriello. 18 Oct 61, 23p. incl. illus. 18 refs. (Rept. no. NAMC-ASL(12)-R360FR101)
Unclassified report

DESCRIPTORS: (*Jet planes, *Boundary layer, *Noise, Acoustics, Measurement, *Aerodynamics, Supersonics, Flight testing.) (Jet engine noise, Measurement.) Airplane noise.

This study was made to determine the feasibility and methods of measuring the boundary-layer, acoustic environment during flight. A list is first presented of the various organizations that have performed work on studies and measurements of acoustic noise for either engine noise or boundary-layer noise. Descriptions are then included of the acoustic environment and of equipment and methods for measuring this environment. Important parameters to be measured are stated, and the need for more supersonic data is emphasized. The results indicate that the measurement of boundary-layer noise is feasible, at least up to sonic speeds. Also, it is more fruitful to run a comprehensive flight-test program with one well instrumented airplane than to partially instrument a number of service airplanes and perform statistical surveys. (Author)

AD-266 087 Div. 9
(TIPTP/WH) OTS price $2.60

Aeronautical Research Associates of Princeton, N. J.
KINETIC EQUATIONS FOR GASES IN EXTERNAL FIELDS,

by James E. McCune and Guido Sandri. Sep 61, 26p. (Proj. Squid technical rept. no. ARAP-1-R) (In cooperation with James Forrestal Research Center, Contract Nonr-18525, Proj. NR 098-038)
Unclassified report

DESCRIPTORS: (*Gases, Magnetic fields, *Kinetic theory, Plasma physics, Equations.) (Mathematical analysis, Integral equations, Differential equations, Partial differential equations.)

The kinetic equation valid for a gas with short range forces in an externally applied field is derived from the Liouville equation. The correction to the Boltzmann equation linear in eta T (the ratio of the time required for two particles to reach their asymptotic momentum in a two body collision to the time required for the field to bring a particle from rest to thermal speed) is calculated. This correction is shown to vanish identically in the weak coupling limit. (Author)

10. FUELS AND COMBUSTION

AD-265 525 Div. 10
(TIPTM/SEB) OTS price $1.60

Bureau of Mines, Pittsburgh, Pa.
RESEARCH ON THE FIRE AND EXPLOSION HAZARDS ASSOCIATED WITH NEW LIQUID PROPELLANTS.
Progress rept. no. 9 (Final), 1 May-31 Aug 61, by David Burgess, Joseph Grumer and Michael G. Zabetakis. 31 Aug 61, 10p. incl. illus. tables. (Contract NAonr-8-61)
Unclassified report

DESCRIPTORS: (*Liquid rocket propellant, Rocket oxidizers, Safety, Hazards, Explosions, Combustion, Ignition, Detonation, Pressure, Flame propagation, Tests.) (Nitrogen compounds, Tetroxides.) (Methyl radicals, Amines, Fluorides.) *Hydrazines, *Methyl hydrazines, *Nitric acid.

Hydrazine, monomethyl hydrazine, unsymmetrical dimethyl hydrazine, the mixed amine fuels MAF-1 and MAF-3, red fuming nitric acid, nitrogen tetroxide, and air with various diluents were examined as to their ignition, flame propagation, pressure rise rates, detonability, liquid burning, and extinguishment. (Author)

AD-265 731 Div. 10, 25
(TIPTM/GEC) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
THE EFFECT OF PREHEATING A BENZENE-AIR MIXTURE ON THE FLAME PROPAGATION VELOCITY,
by L. N. Khinter, Ye. S. Golovina, and A. V. Sorokina. 6 Oct 61, 6p. incl. illus. (Trans. no. MCL-1348 of Issledovaniya Protesessov Goreniya 12:78-80, 1958)
Unclassified report

DESCRIPTORS: (Velocity of *Flame propagation and Heating of Mixtures of Benzene, Air, Turbulent flow, Laminar boundary layer.) (Technological intelligence, Translations, USSR.) Combustion.

A study was made of the effect of preheating a benzene-air mixture on the flame propagation velocity under conditions of both laminar and turbulent flows. The temperature of the mixture delivered to the burners varied from 17 to 227 C. The temperature of the fuel mixture was maintained by a thermocouple at the burner outlet before the instant of ignition. The flame propagation velocity was determined by photographing the flame cone at the burner. Results showed a noticeable increase in the flame propagation velocities with an increase in temperature, somewhat different for different ranges of concentrations. The velocities increased considerably in the region where the fuel was insufficient, while the effect was weaker near the upper boundary of combustion. The effect of the initial preheating of the flame propagation velocity was the same under conditions of turbulent and laminar regimes.

AD-265 810 Div. 10, 4, 25
(TIPTP/WH) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A THEORY OF FLAME PROPAGATION IN SYSTEMS WITH BRANCHED CHAIN REACTIONS.
by L. A. Lovachev. 19 Oct 61, 16p. incl. table. (Trans. no. FTD-TT-61-95 of Izvestiya Akademii Nauk SSR, Otdeleniye Khimicheskikh Nauk 7:1240-1248, 1961)
Unclassified report

DESCRIPTORS: (Translations, USSR.) (*Flame propagation *Combustion, Chain reactions, Theory.) (Thermal conductivity, *Diffusion, Equations, Hydrogen, Oxygen, Hydroxides.)

A theory is presented on flame propagation in systems with branched chain reactions represented by a model reaction with an active center of one type. This problem is solved by calculating the initiation rate, chain propagation rate, chain branching rate, and the second order chain termination rate. A solution of the problem of flame propagation in a system with a branched chain reaction with three active centers is also presented. The combustion of hydrogen was taken as an example of this reaction. A system of thermal conductivity equations and three diffusion equations of hydroxyl, of a hydrogen atom, and an oxygen atom is examined without taking into consideration the second order chain termination. (Author)

AD-265 822 Div. 10, 15
(TIPTM/SEB) OTS price $5.60

Aeronutronic, Newport Beach, Calif.
STUDY OF METAL ADDITIVES FOR SOLID PROPELLANTS. VOLUME I. PROCEDURES.
Final rept., vol. 1,
by R. C. Oliver, B. Kubert and D. L. Hildenbrand. 30 Sep 61, 54p. incl. illus. 11 refs. (Publication no. C-1398)
(Contract NOrd-17980)
Unclassified report

DESCRIPTORS: (*Solid rocket propellants, *Fuel additives, Metals, Thermodynamics, Combustion, Temperature, Exhaust gases, Pressure, Thrust, Specific impulse, Specific heat, Enthalpy, Heat of formation, Theory, Mathematical analysis, Statistical analysis, Equations.)

Formulae for carrying out calculations of specific impulse and other propellant performance parameters are given. An extensive mathematical treatment of the free energy minimization procedure for equilibrium composition calculations is provided. The mathematics include extension of the treatment to include ionized species and mixing condensed phases. A discussion of sources and techniques for thermodynamic property calculations is also included. (Author)

AD-265 823 Div. 10
(TIPTM/SEB) OTS price $1.60

Aeronutronic, Newport Beach, Calif.
STUDY OF METAL ADDITIVES FOR SOLID PROPELLANTS. SUPPLEMENTARY NOTES AND ERRATA,
by R. C. Oliver, D. L. Hildenbrand, and P. R. Basford. 30 Sep 61, 16p. incl. tables.
(Publication no. U-1401)
(Contract NOrd-17980)
Unclassified report

DESCRIPTORS: (*Solid rocket propellants, Fuel additives, Metals.) (Hypersonics, *Ramjet engines, Fuels, Lithium, Beryllium, Lithium compounds, Hydrides, Combustion, Density, Specific impulse, Mathematical analysis, Equations.) (Hybrid rocket propellants, Zirconium.) (Acetylenes, Methanes, Thermodynamics, Data.)

AD-265 894 Div. 10, 4
(TIPTM/EJH) OTS price $2.60

National Cash Register Co., Dayton, Ohio.
A STUDY OF THE ENCAPSULATION APPLICABLE TO LIQUID ROCKET FUEL.
Interim rept. no. 3, 1 Jan-30 June 61,
by Paul Y. Hsieh. June 61, 20p. incl. illus. tables.
(Contract Nonr-284800)
Unclassified report

DESCRIPTORS: (*Liquid rocket propellants, Rocket fuels, Rocket oxidizers, Encapsulation.) (*Drops, *Encapsulation.) (Polymers, *Films, Coatings, Membranes, Production, Physical properties.) Liquids, Gels. (*Hydrazines, *Methyl hydrazines, Ethylenes, *Amines, Encapsulation, Polymerization, Copolymerization, Organic compounds.)

The phenomena involved in encapsulation from nonaqueous media is discussed. Studies included: (1) establishment of the essential conditions for the accumulation of macromolecules around a dispersed liquid droplet to be encapsulated (internal phase), (2) encapsulation of liquids by interfacial polymerization approach, and (3) testing of the compatibility of ethylene diamine, 1,1-dimethyl hydrazine, and hydrazine with various solvents. Amines, especially ethylene diamine, were selected as model compounds. (Author)

AD-265 895 Div. 10, 4
(TIPTM/EJH) OTS price $3.60

National Cash Register Co., Dayton, Ohio.
A STUDY OF THE ENCAPSULATION APPLICABLE TO LIQUID ROCKET FUEL.
Interim rept. no. 2, 1 Apr-31 Dec 60,
by Paul Y. Hsieh. Jan 61, 34p. incl. illus. tables.
(Contract Nonr-284800)
Unclassified report

DESCRIPTORS: (Liquid rocket propellants, Rocket fuels, *Encapsulation.) (*Polymers, *Films, Plastic coatings, Coatings, *Ethyl cellulose, *Nitrocellulose, *Semipermeability, Gases, Vapors.) (*Gases, *Vapors, Solubility, Diffusion, Gas diffusion, Membranes, Films.) Helium, Nitrogen, Oxygen, Argon, Carbon dioxide, Ammonia, Water vapor, Sulfur compounds, Dioxides, Methanes.

Permeability of ethylcellulose and nitrocellulose films to 13 different gases and vapors was determined. The solubility of these gases and vapors in ethylcellulose and nitrocellulose was also measured by gravimetric and volumetric methods of equilibrium sorption. From these data for permeability and solubility, diffusion constants of the gases and vapors in the polymeric films were calculated by means of the relation, P equals DS. It was found that the diffusion constant decreased linearly with an increase of molecular weight; however, the shape factor of the molecules played an important role in diffusion. The solubility constants decreased linearly with an increase of the Lennard-Jones force constants when solubility was expressed on a weight basis rather than a volume basis. It is possible to estimate permeabilities of other gases and vapors in these films from their molecular weights and Lennard-Jones force constants. (Author)

AD-265 947 Div. 10, 27
(TIPTM/GEC) OTS price $2.60

Aeronutronic, Newport Beach, Calif.
THERMODYNAMIC PROPERTIES OF ROCKET COMBUSTION PRODUCTS.
Quarterly technical progress rept. no. 1,
by D. L. Hildenbrand and L. P. Theard. 6 Nov 61, 18p. incl. illus. (Publ. no. U-1438)
(Contract AF 04(611)7442)
Unclassified report

DESCRIPTORS: (*Rocket propellants, Combustion, *Combustion chamber gases, Beryllium compounds, Oxides, Hydrogen, Thermodynamics, Heat of formation, Determination, Chemical reactions, Water.)

A program was initiated to provide thermodynamic data for Be species in cases where critical uncertainties exist and reliable performance data for propellants cannot be calculated. The principal effort centers on determination of the heats of formation of gaseous species in the Be-O-H system. A review of previous work on species in the system at high temperatures is presented. Transpiration studies of the reaction of water vapor with beryllia have given evidence for formation of a volatile product. Plans for positively identifying the product and obtaining thermodynamic data by the mass spectrometric technique are described. Other reactions are proposed for studying Be(OH)2, BeOH and Be2O. A-

description of the high temperature mass spectrometer and gas introduction system being used in this work is given with an outline of the method employed in the study of heterogeneous reactions. (Author)

DELETED

AD-266 034 Div. 10, 12, 2
(TIPTM/EJH) OTS price $9.10

Little, Arthur D., Inc., Cambridge, Mass.
THE SPACE ENVIRONMENT AND ITS INTERACTIONS WITH LIQUID PROPELLANTS AND THEIR STORAGE SYSTEMS, by Norman M. Wiederhorn. Sep 61, 109p. incl. illus. tables (Rept. no. C-63270-02-1)
(Contract NAS 5-664)
Unclassified report

DESCRIPTORS: (*Liquid rocket propellants, Rocket propellants, Rocket fuels, Rocket oxidizers, Storage.) (*Spaceships, *Satellite vehicles, Guided missiles, Propellant tanks, Fuel storage tanks.) *Space environmental conditions, *Electromagnetic waves, Magnetic fields, Particles, *Cosmic rays, Protons, Alpha particles, Electrons, Solar energy, Solar flares, *Van Allen radiation belt, Albedo (Astronomy), Meteors, *Bibliography, Weightlessness.

Contents:
Magnetic fields in space
The vacuum of space (Particles in space; Simulation of the space vacuum; Effects of the space vacuum upon the storage of liquid propellants
The effects of zero G upon storage of liquid propellants
Electromagnetic radiation in space (Electromagnetic radiation: Interations of electromagnetic radiation with the propellant storage system
Particulate radiation in space (Particulate radiation environment-solar winds - solar flares - Van Allen radiation; Interactions of particulate radiation with a propellant and its storage system
Meteroids in space (Meteroid environment; Interactions of meteroids with space vehicles)
Bibliography

AD-266 085 Div. 10, 9, 25, 27
(TIPTP/WH) OTS price $9.60

James Forrestal Research Center, Princeton, N. J.
PROJECT SQUID: A COOPERATIVE PROGRAM OF FUNDAMENTAL RESEARCH AS RELATED TO JET PROPULSION. Semi-annual progress rept. 1 Apr-30 Sep 61. 1 Oct 61, 113p. incl. illus. tables.
(Contract Nonr-185825, Proj. NR 098-038)
Unclassified report

DESCRIPTORS: (*Fluid mechanics, Gases, Gas flow, Magnetic fields.) (*Reaction kinetics, High temperature research, Particles, Scattering.) (*Combustion, Flames, Magnetohydrodynamics, Ions, *Solid rocket propellants.) (Plasma physics, Plasma jets, Jet propulsion.)

Contents:
Fluid mechanics
Transport and transfer processes
Chemical kinetics
Combustion phenomena

AD-266 086 Div. 10
(TIPTM/EJH) OTS price $2.60

Reaction Motors Div., Thiokol Chemical Corp., Denville, N. J.
FLAME STUDIES OF HIGH ENERGY FUELS AND OXIDIZERS HYDRAZINE DIBORANE, OXYGEN DIBORANE, OXYGEN-HYDRAZINE AND HYDRAZINE DECOMPOSITION FLAMES, by M. Vanpee, H. G. Wolfhard and A. H. Clark. Oct 61, 26p. incl. illus. (Proj. Squid technical rept. no. RMD-1-P)
(In cooperation with James Forrestal Research Center, Contract Nonr-185825, Proj. NR 098-038)
Unclassified report

DESCRIPTORS: (*Liquid rocket propellants, *Rocket fuels, *Combustion, Flames, Spectrographic analysis, Low pressure research.) (Mixtures, Hydrazines and *Diboranes or Oxygen.) (Mixtures, Oxygen, Diboranes.) (Light, Intensity.) (Decomposition, Chemical reactions, Test methods, Test equipment.) *Hydrazines.

Premixed flames of N_2H_4-B_2H_6, O-B_2H_6, O-N_2H_4 and the N_2H_4 decomposition flame were stabilized at low pressures and characteristics such as quenching diameter, burning velocity and light emission established. The main emphasis was on the N_2H_4-B_2H_6 system. The stability region of the flame as a function of pressure and linear flow velocity were determined for a number of burners from 15 to 48 mm in diameter. Burning velocities were found to be of the order of 4 to 6 meters per second for mixtures near stoichiometric. The light emitted by the flame is very sensitive to the presence of traces of O. With reactants free from O no emission could be detected in the reaction zone itself in the spectral region studied (1950 to 6500 anstroms). This spectrum is compared with those of the O-B_2H_6, O-N_2H_4 and N_2H_4 decomposition flames. Other properties of the N_2H_4-B_2H_6 flame are compared with those of the above related flames studied. (Author)

AD-266 088 Div. 10, 30
(TIPTP/WA) OTS price $1.60

Atlantic Research Corp., Alexandria, Va.
IGNITION AND COMBUSTION OF ALUMINUM PARTICLES IN

HOT AMBIENT GASES,
by Raymond Friedman and Andrej Macek. Aug 61, 17p. incl. illus. (Proj. Squid technical rept. no. ARC-6-P)
(In cooperation with James Forrestal Research Center, Contract Nonr-185825, Proj. NR 098-038)
Unclassified report

DESCRIPTORS: (*Combustion, *Ignition, Gases, *Aluminum, Particles.) (Photographic analysis, High temperature research, Thermochemistry.)

Observations were made of individual aluminum particles entrained in combustion gases under controlled conditions, at atmospheric pressure. Effects of ambient gas temperature and oxygen content and of aluminum particle size on ignition and subsequent combustion phenomena were determined by flame photography and by microscopic examination of collected particles. Ignition occurs only when the ambient gases are above 2210-2360 K, this temperature being quite insensitive to free oxygen content and particle size. This result is consistent with an ignition theory which assumes a substantial change in the rate of the surface reaction in the melting temperature of alumina (2300 K). When ignition occurs, the delay time, which varies with the square of particle diameter, is in excellent agreement with simple heat-transfer calculations when the initial lag of the particle velocity relative to the gas is taken into account. Once ignition occurs, combustion phenomena are complex, involving unsymmetrical burning and fragmentation. (Author)

11. GROUND TRANSPORTATION EQUIPMENT

AD-265 980 Div. 11
(TIPTB/CCH) OTS price $6.60

Army Transportation Research Command, Fort Eustis, Va.
SCALED VEHICLE MOBILITY FACTORS (SCALE MODEL TIRES IN SNOW).
Interim rept. no. 4,
by Carlo J. Roma and Robert P. McGowan. Oct 61, 63p. incl. illus. tables (TCREC Technical rept. no. 61-118)
Unclassified report

DESCRIPTORS: (Tests of *Tires in Snow, Arctic regions, Ice, Effectiveness.) Failure (Mechanics), Flotation, Experimental data. (*Cargo vehicles, Maneuverability.)

Tests were conducted in snow with six reduced-scale tires. The tires covered a wide range of width-to-diameter ratios. The results are expressed in dimensionless terms and are applicable for a range of vehicle sizes and weights as well as a range of dry snow conditions. Tests described in previous reports have covered the flotation type of performance. Tests described herein cover the performance of two types of tires for the ground-supported (limited snow depth) type of performance and, also, the results of additional flotation tests. The complete flotation data, including that from previous years' tests, are summarized and further analyzed. Present data are limited to 4x4 vehicles with equal weight distribution. The possibility is shown that data for vehicle tests in sand can be interpreted in terms of performance in snow. Results of a preliminary snow survey, which can be used to predict vehicle performance in subarctic, below-the-tree-line snow regions, are shown. (Author)

12. GUIDED MISSILES

AD-265 550 Div. 12
(TIPTP/MFA) OTS price $5.60

Institute of Aerophysics, U. of Toronto (Canada).
ON A RELATIVELY COOL TRANSITION FROM A SATELLITE ORBIT TO AN EQUILIBRIUM GLIDE,
by B. Etkin, June 61, 52p. incl. illus. (UTIA rept. no. 75)
(Contract AF 49(638)761)
(AFOSR-1383) Unclassified report

DESCRIPTORS: (Satellite vehicle research, Orbital flight paths, *Satellite vehicle trajectories, Hypervelocity vehicles, *Heat transfer, Re-entry aerodynamics, Drag, Aerodynamic heating, Enthalpy, Transition temperature.) (Numerical analysis, Integrals, Integral transforms.)

One family of solutions is presented for a monotonic transition from a circular orbit to an equilibrium glide. It is performed at high lift coefficient and low L/D, and terminates at a match point where the prescribed conditions of the glide are met. The vehicle then continues on the glide at a higher value of L/D. The high drag required during transition entails the use of a large auxiliary light-weight drag body, which is jettisoned upon arrival at the match point. The presence of this drag body results in a reduction of the total heat load on the vehicle itself. The exact amount of this reduction depends on the details of the design, but it can be typically of the order of 3/4 in an entry with a peak acceleration of the order of 7 g. As a result, the maximum average vehicle temperature can be made relatively low, with consequent advantages in the structural design, and in the thermal protection of the payload. (Author)

AD-265 595 Div. 12
(TIPTA/WAW) OTS price $1.15

National Aeronautics and Space Administration, Washington, D. C.
EFFECTS OF FLIGHT CONDITIONS AT BOOSTER SEPARA-

TION ON PAYLOAD WEIGHT IN ORBIT,
by Richard D. Nelson. Nov 61, 45p. incl. illus. tables (NASA Technical note no. D-1069)
Unclassified report

Also available from NASA, Wash. 25, D. C., as NASA Technical note no. D-1069.

DESCRIPTORS: (*Satellite vehicles, *Satellite vehicle trajectories, Dynamics, Mathematical analysis, Differential equations.) (*Separation, Effectiveness, *Booster rockets.) Booster rockets, *Recovery.

A study of the principal flight parameters at booster separation was conducted to find the effect of each on the weight of the payload boosted into an earth orbit along a zero drag gravity turn trajectory. The parameters considered include Mach number (3 to 9), flight-path angle (10 to 55 degrees) altitude (90,000 and 350,000 ft), inert weight ratio (0.05 to 0.15), and thrust-weight ratio (1.5 to 2.5), with a specific impulse of 289 seconds. Both transfer ellipse and direct orbit trajectories were considered. With either trajectory method, payload weight was highest for low initial flight-path angles and high initial Mach numbers. Of course, high initial Mach numbers require greater energy expenditures from the booster. Changes in initial altitude had little effect on payload weight, and only small gains were evident when thrust-weight ratio was increased. (Author)

AD-265 622 Div. 12
(TIPTP/MFA) OTS price $4.60

Aeronautical Chart and Information Center, St. Louis, Mo.
THEORETICAL CONSIDERATIONS CONCERNING THE APPLICATION OF GRAVIMETRIC DATA TO MISSILE TRAJECTORIES AND THE RESULTANT EFFECTS ON THE CEP,
by Luman E. Wilcox. Feb 61, 43p. incl. illus. (Technical rept. no. 92)
Unclassified report

DESCRIPTORS: *Guided missiles, Gravity, Data, Orbital flight paths, *Guided missile trajectories, Earth, Atmosphere models, Instrumentation, Gyroscopes, Accelerometers, Computers, Numerical analysis, Trigonometry, Partial differential equations, Probability.

A general theoretical method is presented for computing the target impact error of a ballistic flight caused by the anomalous gravity. Solution of the problem involves computation of a nominal trajectory, extrapolation of the anomalous gravity to the trajectory, and the determination of the target impact error. (Author)

AD-265 717 Div. 12, 19
(TIPTW/WAW) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
A GYROSCOPE FOR INERTIAL SYSTEMS,
by V. N. Timoshchenko. 4 Oct 61, 4p. incl. illus. (Trans. no. MCL-1312 from Byulleten Izobreteniy 15, 1960)
Unclassified report

DESCRIPTORS: (*Gyroscopes, Design.) Inertial navigation, Inertial guidance, Technological intelligence, USSR, Translations.

A gyroscope for inertial systems with the sensing element suspended in a liquid is described. The stator of this element is fed by a current passing through the liquid. For the purpose of eliminating imbalance in the rotor during its operation, and imbalance arising from nonuniform abrasion of the bearings, a gapless rotor suspension is used. The bearings are constantly under the action of a constant fluid-pressure force through the hemispheres of the stator shell. For the purpose of centering the suspension of the inner Cardan ring in the liquid, electromagnets are used in the suspension; they are secured on the casing, are located diametrically along the three axes, and confine the sensing element in a central position with respect to the stabilization axes. For the purpose of eliminating the harmful effect on the rotor resulting from external forces caused by a possible structural asymmetry, the gyroscope casing is made to rotate about the rotor's own axis of rotation. (Author)

AD-265 733 Div. 12
(TIPTB/JAB) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
FLIGHT TO MARS,
by A. Shternfel'd. 18 Sep 61, 6p. (Trans. no. MCL-1380 of Economicheskaya Gazeta 148, 4p., 24 June 61)
Unclassified report

DESCRIPTORS: (*Space flight, *Mars, USSR.) (Take-off, Landing.) *Translations.

AD-265 827 Div. 12, 22
(TIPTE/CDM) OTS price $2.60

Amphenol-Borg Electronics Corp., Chicago, Ill.
DEVELOPMENT OF A TWO-CONDUCTOR SHIELDED CABLE CONNECTOR FOR USE IN MISSILE FIRING CIRCUITS. Quarterly technical progress rept. no. 1, 28 June-28 Sep 61,
by William J. Mashek. 28 Sep 61, 24p. incl. illus. 13 refs. (Rept. no. 1-161)
(Contract N178-7933)
Unclassified report

DESCRIPTORS: (*Electric connectors, *Electric cables, *Electromagnetic shielding, Design, Naval equipment.) (Radiofrequency attenuators, Electromagnetic waves, Wave transmission, Test methods.) (Missile launchers, Guided missile launchers.)

An investigation was begun on parts and assembly techniques leading to and including the development of a two-conductor shielded cable connector suitable for use in missile firing circuits. Studies are being conducted to determine the feasibility and means of meeting Navy objectives and also to prepare a suitable electrical testing procedure which will be used to evaluate the shielding effectiveness of the connector to be developed. The current areas of study and investigation dealt with the developmental objectives, the preliminary connector design concepts, and the evaluation of shielding effectiveness. (Author)

AD-265 855 Div. 12
(TIPTP/JW) OTS price $7.60

General Dynamics/Convair, San Diego, Calif.
SATELLITE STABILITY RESEARCH. VOLUME II.

Final rept. on Studies Pertaining to BAMBI.
Sep 61, 76p. incl. illus. 24 refs. (Rept. no. ZR-AP-061-20, vol. 2)
(Contract AF 04(647)644)
(SSD TR 61-14) Unclassified report

DESCRIPTORS: (*Satellite vehicles, Orbital flight paths, *Satellite altitude, Dynamics, Spin, Damping, Control systems.) (Satellite vehicles, Stability, Gravity, Control systems.)

The attitude stability and control of a satellite which spins many times per orbit are described. Equations are derived and solved for the behavior of a spinning satellite in a circular orbit about a spherical earth. Gravity gradient is included in the equations. Active control means are considered for attitude control. Both active and passive methods of damping nutations are investigated. The effect of orbit precession and spin rate decay are discussed. (Author)

AD-265 888 Div. 12, 6
(TIPTP/MFA) OTS price $.75

National Aeronautics and Space Administration, Washington, D. C.
PROJECT ECHO. SATELLITE TRACKING RADAR,
by O. E. De Lange. Nov 61, 25p. incl. illus.
(NASA Technical note no. D-1135)
Unclassified report

Also available from NASA, Wash. 25, D. C., as NASA Technical note no. D-1135.

DESCRIPTORS: (*Satellite vehicles, *Radar tracking, Orbital flight paths, Earth, *Balloons.) (Instrumentation, Oscillators, Amplifiers, Frequency multipliers, Radar equipment, Generators, Radar transmitters, Klystrons, Radar antennas, Cathode ray tubes.) (Experimental data, Photographs.)

The radar employed at the Bell Telephone Laboratories' Holmdel, New Jersey site for tracking the Echo I satellite was originally designed for the sole purpose of antenna pointing. Recently, however, it has also been employed to measure earth-balloon-earth path loss at regular intervals of time in order to ascertain the balloon's condition. The performance of the system and some of the data obtained are discussed. (Author)

AD-265 890 Div. 12
(TIPTP/JW) OTS price $1.00

National Aeronautics and Space Administration, Washington, D. C.
POINT RETURN FROM A LUNAR MISSION FOR A VEHICLE THAT MANEUVERS WITHIN THE EARTH'S ATMOSPHERE,
by Simon C. Sommer and Barbara J. Short. Nov 61, 31p. incl. illus. (NASA Technical note D-1142)
Unclassified report

Also available from NASA, Wash. 25, D. C., as NASA Technical note D-1142.

DESCRIPTORS: (*Re-entry aerodynamics, Satellite vehicles, *Lunar probes.) (Space probes, Atmosphere entry, Satellite vehicle trajectors.) (Re-entry vehicles, Lift, Drag.)

The point return of a vehicle with a lift-to-drag ratio of 1/2, returning from a lunar mission, was investigated. The range of a vehicle that is restricted to an altitude below 400,000 feet after entry is compared to the range of a vehicle that is allowed to skip to an altitude of 400 miles. Required entry conditions for point return are examined for sample cases of skip and no-skip trajectories.

AD-265 891 Div. 12, 2, 30
(TIPTP/JW) OTS price $1.00

National Aeronautics and Space Administration, Washington, D. C.
INFRARED AND REFLECTED SOLAR RADIATION MEASUREMENTS FROM THE TIROS II METEOROLOGICAL SATELLITE.
by W. R. Bandeen, R. A. Hanel and others.
Nov 61, 32p. incl. illus. table (NASA Technical note no. D-1096)
Unclassified report

Also available from NASA. Wash. 25, D. C. as NASA Technical note no. D-1096.

DESCRIPTORS: (Meteorological data, Measurement, Instrumentation, Thermistors.) (*Satellite vehicles, Meteorological instruments, *Infrared radiation, Thermal radiation, Reflection.) (Orbital flight paths, Albedo (Astronomy), *Radiometers, *Bolometers.)

In the TIROS II, the satellite's spin provides the scan line of the medium resolution radiometer which is then advanced by the orbital motion. The spatial resolution is about 40 miles square when the earth directly beneath the satellite is viewed. The five channels employ bolometer detectors and filters to limit the spectral responses to five bands: 6 to 6.5 microns, 8 to 12 microns, 0.2 to 6 microns, 8 to 30 microns, and 0.55 to 0.75 microns. These five bands study, respectively: radiation in the water vapor absorption band; day and nighttime cloud cover; albedo; thermal radiation; and visual maps for comparison with satellite vidicon pictures. The low resolution non-scanning radiometer measures the earth's blackbody temperature and albedo. This radiometer consists of two thermistors, each in the apex of a reflective cone which provides optical gain. One thermistor is black and responds to both thermal and reflected solar radiation. The second responds to thermal but reflects solar radiation. (Author)

AD-265 913 Div. 12, 1
(TIPTA/WAW) OTS price $1.60

Naval Research Lab., Washington, D. C.
TECHNIQUES FOR THE RAPID ESTIMATION OF ACCELEROMETER NATURAL FREQUENCIES.
Interim rept.,
by E. W. Clements and M. G. Stone. 6 Oct 61, 10p. incl. illus. tables, 17 refs. (NRL rept. no. 5681)
Unclassified report

DESCRIPTORS: (*Accelerometers, Resonance, Measurement, Piezoelectric transducers, Damping, Test methods.)

In order to determine the usable frequency range of an accelerometer, it is necessary that its natural frequency be known. There are four simple methods for making an approximate determination of accelerometer natural frequency. In two of these methods, the accelerometer is excited by either electrical or mechanical pulse inputs, and the ringing frequency is measured. In the other two methods, either the impedance or the capacitance of the accelerometer is measured as a function of frequency. While subsidiary to more refined calibration techniques, these methods are useful because of their speed and simplicity and because they may be utilized with the accelerometer in place. Results have been obtained for several piezoelectric accelerometers. (Author)

AD-265 920 Div. 12, 30
(TIPTP/JW) OTS price $1.25

National Aeronautics and Space Administration, Washington, D. C.
THE SMOKE-TRAIL METHOD FOR OBTAINING DETAILED MEASUREMENTS OF THE VERTICAL WIND PROFILE FOR APPLICATION TO MISSILE-DYNAMIC-RESPONSE PROBLEMS, by Robert M. Henry, George W. Brandon and others. Oct 61, 45p. incl. illus. table (NASA Technical note no. D-976)
Unclassified report

Also available from NASA, Wash. 25, D. C., as NASA Technical note no. D-976.

DESCRIPTORS: (*Vertical gust recorders, Smoke generators, Guided missile trajectories.) (*Guided missile tracking systems, Thrust, Launching, Wind, Measurement.)

A method is presented for obtaining a detailed, accurate profile over a large altitude range. The method utilizes photogrammetric measurement of successive positions of the trail of an ascending rocket. Construction of a rocketborne smoke generator is discussed and the photography, film reading, and data-reduction procedures are described. The accuracy of the method is examined and error equations are derived. Examples of wind profiles measured by this method are shown, and their implications for missile response are indicated. (Author)

AD-265 977 Div. 12, 8
(TIPTW/DLW) OTS price $1.60

Friez Instrument Div., Bendix Corp., Baltimore, Md.
DESIGN AND DEVELOPMENT OF A REMOTE SETTING MINIATURE BAROSWITCH AND SETTER FOR USE IN GUIDED MISSILE ADAPTION KITS.
Rept. no. 12, 1-31 Aug 61,
by L. C. Friend, K. D. Shaub, and J.H. Stoudenmire. 31 Aug 61, 12p. incl. illus. tables.
(Contract DA 36-034-ORD-3284, Proj. TN 2-8106)
Unclassified report

DESCRIPTORS: (*Pressure switches, Barometric pressure, Guided missile warheads, Guided missile fuzes, Guided missiles, Surface to surface, *Miniature electronic equipment, Electronic switches, Transistors, Sliding contacts, Remote control systems, Vibration isolators, Design.)

Investigations were made to finalize the designs of the baroswitch and setter. A more rigid setting arm removed vibration troubles in the baroswitch element. Mounting of internal baroswitch mechanism utilizes rubber grommets. This arrangement avoids stresses when mounting unit and provides some vibration isolation, particularly at higher frequencies. Isolation reduces chance of damage to components and makes requirement for balancing of elements less critical. (Author)

AD-266 023 Div. 12
(TIPTW/CRJ) OTS price $1.60

General Dynamics/Convair, San Diego, Calif.
A MODULAR CONCEPT OF LAUNCH CONTROL EQUIPMENT FOR RESEARCH AND DEVELOPMENT MISSILE SITES.
by Richard Teller and Hoyt D. Jeter. Oct 61, 10p. incl. illus.
Unclassified report

DESCRIPTORS: (*Guided missiles, Launching, Control systems, *Ground support equipment, *Electrical networks, Design.) (Test facilities, *Launching sites, Electronic circuits, Electric wire, Electric cables, Electric terminals, Panel boards (Electricity). (Electronic equipment, Electric relays, Switching circuits, Test equipment, Test methods.)

Launch control equipment will usually require a larger number of wire terminations than equipment designed to utilize more familiar construction techniques. This disadvantage is greatly over-shadowed by the increased flexibility of a system which uses the modular concept. Since it is possible to exercise more rigid and thorough quality control in the factory, reliability can be further assured and system integrity maintained indefinitely. (Author)

AD-266 084 Div. 12, 15
(TIPTP/MFA) OTS price $3.60

Ballistic Research Lab., Aberdeen Proving Ground, Md.
ORBIT DETERMINATION FROM SIMULTANEOUS RADIO DOPPLER-SHIFT MEASUREMENTS,
by Ceslovas Masaitis and Michael J. Romanelli. Aug 61, 36p. (BRL memo. rept. no. 1332)
Unclassified report

DESCRIPTORS: (*Orbital flight paths of *Satellite vehicles, Radio signals, *Doppler systems, Radio waves, Radio transmission.) (Numerical analysis by Digital computers, Programming, Partial differential equations, Nonlinear systems.) (Data, Tables.)

A method of computing the orbit of a satellite from radio Doppler shift measurements is described. It is assumed that radio signals originate at a transmitter on the ground, are reflected by a satellite and received at three receivers during the same pass of the satellite over the area in which the four stations are located. Examples of orbit computations are given. (Author)

13. INSTALLATIONS AND CONSTRUCTION

AD-265 628 Div. 13
(TIPTB/MS) OTS price $4.60

Army Engineer Waterways Experiment Station, Vicksburg, Miss.
INVESTIGATION OF PRESSURES AND DEFLECTIONS FOR FLEXIBLE PAVEMENTS. DEVELOPMENT OF REPRESENTATIVE SOIL STRENGTHS FROM LABORATORY TESTS.
Dec 60, 43p. incl. illus. tables (Technical memo. no. 3-323, rept. no. 5)
Unclassified report

DESCRIPTORS: *Soils, Stresses, Mathematical analysis, Tests.

This report describes a triaxial test program conducted to establish a test method or procedure whereby stress-strain curves developed from laboratory tests on small samples would duplicate the field data curves. By trial and error it was found that curves developed in variable-confining-pressure triaxial tests on (1) undisturbed samples from the clayey silt test section and (2) prepared samples of sand from the sand test section yielded stress-strain curves duplicating the field data so closely as to be identical for practical purposes. It is believed that a theoretical loading curve can be used with the variable-confining-pressure triaxial test to develop stress-strain relations for soils of the type used in the tests reported, and perhaps for other types as well. (Author)

AD-265 634 Div. 13
(TIPTB/MS) OTS price $3.60

Bureau of Mines, Pittsburgh, Pa.
PRELIMINARY REPORT ON STUDIES OF AIR FLOWS INTO CONTROLLED FIRES.
Interim rept. no. 1, 1 May 60-31 July 61,
by J. Grumer, A. Strasser and T. A. Kubala.
31 July 61, 38p. incl. illus. table.
(Contract NAonr 24-60)
Unclassified report

DESCRIPTORS: (*Fires, Control, Instrumentation, Test equipment, Measurement, Thermal column, Air, Air blast, Wind.)

This investigation seeks to determine whether an uncontrolled fire of the character of a fire storm can generate winds by induction of air into it--and thereby accelerate the burning rate. Measurements have been made of burning rates of laboratory-scale fires of solid fuel beds and the resultant air velocities. Measurements have also been made of such burning rates in the presence of imposed winds. These experiments have shown that only air flow into the burning fuel bed affects the burning rate. Air flow into the luminous fire column above the fuel bed and into the thermal column above it do not significantly affect the burning rate. Furthermore, air flow into the fuel bed has been roughly approximated in one instance on the basis that the fuel bed is equivalent to a porous packed column and that the radial velocity head of the inflowing air is equal to the vertical head due to the buoyancy and momentum of the burned gases. This report presents exploratory experiments; only tentative conclusions are drawn. (Author)

AD-265 699 Div. 13, 17
(TIPTW/RD) OTS price $3.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
REPORT ON THE OPERATIONS OF LISICHANSK PLANT PODZEMGAZ FROM 1954 TO 1956,
by O. V. Kruglov. 3 Oct 61, 35p. incl. illus. tables (Trans. no. 1241 of Podzemnaya Gazifikatsiya Uglya 2:31-38, 1957)
Unclassified report

DESCRIPTORS: (Technological intelligence, USSR, Translations.) (*Gases, Hydrocarbons, *Production.) (Gas generating systems, Underground structures, Effectiveness.) (Coal, *Mining engineering.)

Considerable work was performed for the improvement of the process of underground coal gasification. A new technological method was developed and introduced, which consists of blowing in air from the degasified space. The first test of gasifying a bed along a horizontal well was successfully completed. (Author)

14. MATERIALS (NON-METALLIC)

AD-265 532 Div. 14
(TIPTB/JAB) OTS price $1.60

Forest Products Lab., Madison, Wis.
FATIGUE TEST OF PHENOLIC LAMINATE AT HIGH STRESS LEVELS AND ELEVATED TEMPERATURES,
by G. H. Stevens. Aug 61, 19p. incl. illus. tables (Rept. no. 1884)
(Contracts AF 33(616)58-1 and AF 33(616)61-06; In cooperation with Wisconsin U.)
Unclassified report

DESCRIPTORS: (*Laminates, *Phenolic resins, Mechanical properties, Fatigue (Mechanics).)

This report covers fatigue tests made on representative laminates of CTL-91LD resin reinforced with 181-A1100 glass fabric. Fatigue tests with axial loads applied parallel to the warp direction and at zero mean stress were made at the rate of about five cycles per minute. Specimens were tested at room temperature (73 F.), 400, 500, 600, and 800 F. All the tests were made on a constant-load type machine and loading was to high stress levels. Starting with the average value found in the static control test, the loads were progressively lowered until a specimen would maintain the established load for about 200 cycles without failure. The specimens, with few exceptions, failed on that portion of the cycle, either in tension or compression, that had the lowest average value in the static control test. Fatigue tests at room temperature showed that at 80% of the tension-control strength, specimens would sustain about 200 cycles of repeated loading. At the elevated temperatures, however, there were no clearly indicated trends between 1 and 200 cycles because of strength-time-temperature variations. (Author)

AD-265 555 Div. 14, 26, 31
(TIPTB/CCH) OTS price $2.60

Materials Testing Lab., Portsmouth Naval Shipyard, N. H.
DEVELOPMENT OF SYNTHETIC RUBBER MATERIAL FOR GASKETS AND PACKINGS IN DEEP SUBMERGENCE SUBMARINES.
Progress rept. no. 2,
by Billy H. Swift. 25 Oct 61, 21p. incl. illus.
(Rept. no. RD61-10M/a)
(Proj. SF-013-13-01)
Unclassified report

DESCRIPTORS: (Design and Tests of *Gaskets, *Rubber gaskets, *Synthetic rubber, Nitrile rubber, Elastomers in Submarines.) (Test methods, Pressure, Underwater.)

A second phase in the development of deep submergence gasket material has been completed. Three rubber stocks, selected on the basis of tests described in Progress Report No. 1, have now been evaluated in a high-pressure test tank. One of the stocks performed satisfactorily in all aspects, but may be too high in hardness for certain applications. A third phase of the project is nearly complete. A group of seven stocks in the 60-80 durometer hardness range are being tested in the Laboratory, and current data indicate that at least two of them should be evaluated in the pressure test tank as candidate materials. (Author)

AD-265 637 Div. 14
(TIPTM/SEB) OTS price $6.60

Emerson and Cuming, Inc., Canton, Mass.
DEVELOPMENT OF A POROUS METALLIC COMPOSITE MATERIAL.
Final technical rept.,
by George H. Bischoff and Angelo H. Rossetti.
24 June 60, 69p. incl. illus. tables.
(Contract DA 19-020-505-ORD-4971, Proj. TB4-003)
(WAL TR 375/1) Unclassified report

DESCRIPTORS: (*Porous metals, Coatings, Paints, Metals, Deposits on Glass, *Porous materials, Porous glass, Plastics, Expanded plastics, Clays, Aluminum compounds, Oxides, Polymers, Styrenes, Urethanes.) (Copper, Nickel, Silver, Graphite.) (Bonding of Porous metals, Spheres.) (Plating, Vacuum apparatus, Electroplating, Vapor plating, Electrochemistry.)

The feasibility of making a porous metallic composite by bonding hollow metal spheres was demonstrated. Methods were developed for making hollow metal spheres by metallizing the surface of ceramic and plastic spheres. Hollow glass microspheres in the 1. 0 to 5. 0-mil diam. range were metallized by electroless Cu, Ni, and Ag processes. The building up of a sufficient metal thickness on these microspheres for bonding into a porous metallic composite appears impractical. Hollow clay spheres and hollow alumina bubbles were metallized by both electroless processes and by electrolytic processes. Expanded polystyrene spheres were metallized by electrolytic processes. Heavy metal coatings of 1 to 5 mils thickness were electroplated on 137-mil diam polystyrene spheres. The polystyrene was then completely removed by heating to 600-650 F. Ni, Cu, and Ag were successfully electroplated to form hollow metal spheres by this process. (Author)

AD-265 652 Div. 14, 26
(TIPTM/EJH) OTS price $1.10

Goodrich, B. F., Aerospace and Defense Products, Akron, Ohio.
DEVELOPMENT, SELECTION, TESTING OF BASIC MATERIALS AND FABRICATION OF THERMAL RADIATION PROTECTIVE ASSEMBLIES.
Bi-monthly engineering rept. no. 7, 9 June-8 Aug 61,
by W. J. Berus. 8 Aug 61, 2p.
(Contract NOa(s) 60-6095-c)
Unclassified report

DESCRIPTORS: (*Protective clothing, *Glass textiles, *Nylon, Synthetic fibers, Thermal insulation, Mechanical properties, Manufacturing methods.) (Thermal radiation, Aviation personnel, Insulating materials, Sewing machines.) Protective clothing.

Samples of woven glass fabrics were examined with respect to sewing characteristics, seam strength, drape characteristics and general handling characteristics. The tendency to fray is eliminated by the application of a cement to the appropriate area before actually cutting the material. An increase in seam strength is obtained by using a special high speed needle and a low number of stitches per inch. Stitches such as the zig-zag with varied dimensions and the double zig-zag have proven somewhat successful. The fold-over and french seam have also exhibited good strength characteristics. A sample of a plain woven glass cloth, 4.0 mils thick, with a zig-zag stitch and fold-oven seam, was tested in a bag 30 in. long and 12 in. in diameter. The bag was pressurized to 4.8 psig before failure of the seams. A glass-nylon combination cloth was tested in the same bag with a plain seam and a zig-zag stitch. The seam withstood 10 psig for 20 min. without deleterious effects. (Author)

AD-265 734 Div. 14
(TIPTM/SEB) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
AIRPLANE IS DRESSED IN GLASS.
21 Sep 61, 1p. incl. illus. (Trans. no. MCL-1381 of Krylʹya Rodiny 6:pp. 30, 1960)
Unclassified report

DESCRIPTORS: (Plastics, Reinforcing materials, *Glass textiles in Airplanes.) (Technological intelligence, Translations, USSR.)

AD-265 746 Div. 14,
(TIPTM/REB) OTS price $3.60

Watertown Arsenal Labs., Mass.
PROTECTIVE COATINGS FOR TITANIUM AND STEEL MORTAR COMPONENTS. PHASE I. ANTI-GALLING COATINGS FOR TITANIUM MORTAR BIPOD COMPONENTS,
by Milton Levy and John B. Romolo. Oct 61,
32p. incl. illus. tables, 19 refs. (Technical rept. no. WAL TR 405.56/1)
(Proj. 501-13-039)
Unclassified report

DESCRIPTORS: (Mortars, Materials, *Titanium alloys, *Steel, *Nickel plating, Phosphides, Coatings.) Heat treatment, Friction, Diffusion, Bonding, Hardness, Mechanical properties, Impact shock, Microstructure.

Electroless Ni-P alloy plate was investigated as an anti-galling coating for Ti alloys. The alloy was deposited in a modified National Bureau of Standards alkaline bath. Adherence, wear and abrasion resistance were improved by heat treating at relatively high temperatures. Diffusion bonding with minimum beta transformation was detected by metallography and x-ray diffraction. Resistance to wear and abrasion was correlated with structure, and assessed metallographically. Several Ti alloy mortar bipod components were electroless Ni plated, heat treated and evaluated under service conditions. (Author)

AD-265 775 Div. 14, 26
(TIPTM/EJH) OTS price $2.60

Narmco Industries, Inc., San Diego, Calif.
DEVELOPMENT OF EXO-REACTANT INORGANIC ADHESIVE

SYSTEM.
Quarterly progress rept. no. 5, 1 Oct - 31 Dec 60,
by William Bassett and Roger A. Long. 1 Jan 61, 25p. incl. tables.
(Contract NOas 60-6061-c)
Unclassified report

DESCRIPTORS: (Stainless steel, Sheets, *Sandwich panels, *Honeycomb cores, *Bonding, Bonded joints, Metal joints.) (*Adhesives, *Metal seals, Seals, Mixtures, Materials, Copper compounds, Silver compounds, Oxides, Silicon compounds, Dioxides.) (Adhesion, High temperature research, High pressure research, Mechanical properties, Heating, Processing, Heat transfer.)

The overlap bonding evaluation of all exothermic adhesive bonding was completed. Results indicated the bonds were sufficiently ductile to withstand mechanical shock and to resist peel. Procedures for fabricating honeycomb panels up to 2- x 2-in were developed and specifications written. Procedures for fabricating 3- x 4-in. and 3- x 8-in panels were being developed at report time. At the end of this quarter and because of the contract time shortage, it was found necessary to employ an auxiliary external exotherm to produce good honeycomb bonding without burning small holes in the core cell walls. (Author)

AD-265 776 Div. 14, 25
(TIPTM/EJH) OTS price $2.60

Narmco Industries, Inc., San Diego, Calif.
DEVELOPMENT OF EXO-REACTANT INORGANIC ADHESIVE SYSTEM.
Quarterly progress rept. no. 4, 1 July - 30 Sep 60,
by William Bassett and Roger A. Long. 1 Oct 60, 24p. incl. tables.
(Contract NOas 60-6061-c; Continuation of Contract NOa(s) 58-857-c)
Unclassified report

DESCRIPTORS: (Stainless steel, Sheets, *Sandwich panels, *Honeycomb cores, *Bonding, Bonded joints, Metal joints.) (*Adhesives, *Metal seals, Seals, Mixtures, Materials, Copper compounds, Silver compounds, Oxides, Silicon compounds, Dioxides.) (High pressure research, High temperature research, Shear stresses, Impact shock, Mechanical properties, Adhesion, Tests.)

The refinement of the Cu and Ag based exothermic adhesive systems for overlap bonding, fabricating overlap specimens specified in the contract was completed. The development of an exothermic adhesive composition and associated procedures for honeycomb panel bonding continued. Stainless steel lap shear strengths using Ag base exotherms were consistently above 5300 psi with most failures in the stainless parent metal, the average strength being 9173 psi. No appreciable change in strength was noted up to 600 F. At 800 F this average was 8941 psi. Bend tests demonstrated the bonds were metallic, with little or no included glass. Honeycomb core cell bonding to skins was achieved but core cell burn through, although greatly reduced, still remained a problem. (Author)

AD-265 777 Div. 14,
(TIPTM/EJH) OTS price $1.60

Narmco Industries, Inc., San Diego, Calif.
EXO-REACTANT NICKEL BASE STRUCTURAL ADHESIVES.
Quarterly progress rept. no. 2, 1 Apr - 1 July 61,
by Ralph Armstrong and Roger A. Long. July 61, 12p. incl. tables.
(Contract NOw 61-0308-c)
Unclassified report

DESCRIPTORS: (*Stainless steel, *Bonding, Bonded joints, Metal joints, Brazing, *Nickel alloys.) (*Adhesives, Metal seals, Seals, Materials, Soldering fluxes, Ceramic materials.) Heat resistant alloys, Metallic compounds, Fluorides, Oxides, Chemical reactions, Thermochemistry, Melting, Tests.

A method was developed for bonding stainless steel in air with a Ni base alloy by utilizing an exothermic reaction, the products of which provide the braze alloy, flux, and the major part of the heat required. During this report period, the process has been improved from the standpoint of bond strength and reproducibility. Efforts to apply the process to aluminum and titanium containing nickel and cobalt base super alloys have not yet been successful. (Author)

AD-265 782 Div. 14, 31
(TIPTM/EJH) OTS price $2.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
DETERIORATION OF 600-VOLT CABLE SHEATHS BY FLOTATION-TYPE CORROSION INHIBITORS,
Final rept.,
by A. E. Hanna. 9 Oct 61, 29p. incl. illus. tables (Technical rept. no. 162)
Unclassified report

DESCRIPTORS: (Floating docks, Ballast tanks, Corrosion inhibition, Chemicals, Cathodic protection, *Electric cables, Coatings, Plastic coatings, Deterioration, Sea water.) (Coatings, Polymers, Butadienes, Acrylonitriles, Vinyl chlorides, Ethylenes, Synthetic rubber.) Tests.

Failure of cathodic protection systems has been attributed to the deterioration of sheathing of electrical conductor cables immersed in flotation-type corrosion inhibitors. Cable manufacturers and distributors were asked to recommend a sheath material for cathodic protection cables in floating dry-dock ballast tanks. Materials suggested were polyethylene, polyvinyl chloride, neoprene, and a butadiene-acrylonitrile copolymer. Quantities of cables sheathed with these materials were ordered and tested with stock cables obtained from Naval supply sources. A butadiene-acrylonitrile copolymer was found to be superior to all others after 300 hr of immersion in typical flotation-type corrosion inhibitors. The next most resistant was the polyvinyl-chloride sheath, followed closely by a Navy stock neoprene and a homogeneous polyethylene serving as both jacket and insulation. (Author)

AD-265 796 Div. 14
(TIPTM/BSW) OTS price $1.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
THE EFFECT OF IMPURITIES AND TITANIUM DIOXIDE

Division 14 - MATERIALS (NON-METALLIC)

ADMIXTURES ON THE PROCESS OF STABILIZING ZIRCONIUM DIOXIDE (Vliyanie Primesey i Dobavok Dvuokisi Titana Na Protsess Stabilizatsii Dvuokisi Tsirkoniya),
by E. K. Keler and A. B. Andreyeva. 21 Sep 61, 11p. incl. illus. tables, 10 refs. (Trans. no. MCL-1423 of Ogneupory 23:552-558, 1958)
Unclassified report

DESCRIPTORS: (Refractory materials, *Zirconium compounds, Dioxides, Phase studies, Additives, Impurities, Sintering, Thermal expansion, Physical properties, Mechanical properties, Crystal structure, Stabilization.) (Technological intelligence, Translations, USSR.) (Mixtures, Titanium compounds, Dioxides.)

TiO2 present in technical ZrO2 in form of admixture or artificially added, does not produce a positive affect on the sintering of Zr mixtures. In addition it reduces the stabilization of ZrO2 in solid solution of cubical structure, binding a part of the stabilizing admixture in the formation of corresponding (homologous) titanates. The presence of TiO2 promotes, in addition, coarse grain crystallization of ZrO2, which also has a negative effect (deterioration) on the mechanical properties of the objects. When stabilizing with MgO the negative influence of TiO2 is reflected more vividly then during the stabilization with CaO. The content of TiO2 in technical ZrO2 should be taken under consideration and compensated during the stabilization of such a product by a corresponding increase in the addition of the stabilizing acid. (Author)

AD-265 806 Div. 14
(TIPTM/BRW) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A HIGH-VACUUM, HIGH-TEMPERATURE, SOLID LUBRICANT (Tverdaya Vysokovakuumnaya Vysokotemperaturnaya Smazka)
by L. N. Sentyurikhina, B. N. Malyshev and others. 4 Oct 61, 6p. incl. tables (Trans. no. FTD-TT-61-58 of Khimiya i Tekhnologiya Topliv i Masel 7:13-15, 1961)
Unclassified report

DESCRIPTORS: (*Lubricants, Solids, *Molybdenum compounds, Sulfides, High temperature research, Low pressure research.) (Films, Adhesion to Metals.) (Translations, Technological intelligence, USSR.)

AD-265 816 Div. 14, 26
(TIPTM/GEC) OTS price $2.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
GLASS PLASTICS,
by B. A. Kiselev. 22 Sep 61, 26p. 74 refs. (Trans. no. FTS-9967 of Uspekhy Khimii 28:1101-1114, 1958)
Unclassified report

DESCRIPTORS: Reinforcing materials, *Plastics, *Glass textiles, Production, Manufacturing methods, Filament wound construction.) (Processing of Textiles, Organic azides, Salts, Organic compounds of Silicon.) (Binders, Esters, Epoxy resins, Phenolic resins, Silicone resins.) (Technological intelligence, Translations, USSR.) *Laminates.

Contents:
Pretreatment of vitrofibrous filler for manufacture of glass plastics
Binders, applicable in the production of glass textolites
Polyester binders
Binders, based on epoxy-resins
Binders, based on phenolformaldehyde resins
Binders, based on silicon-organic resins

AD-265 856 Div. 14, 26, 27
(TIPTM/SEB) OTS price $8.60

Georgia Inst. of Tech. Engineering Experiment Station, Atlanta.
FUSED SILICA ROCKET NOZZLES.
Final summary rept., 1 Sep 60-31 Aug 61,
by N. E. Poulos, C. A. Murphy and others.
31 Aug 61, 94p. incl. illus. tables.
(Contract NOrd-18564)
Unclassified report

DESCRIPTORS: (*Rocket motor nozzles, Refractory materials, *Refractory coatings, *Tungsten.) (*Carbides of Chromium compounds, Hafnium compounds.) (Oxides of Aluminum compounds, Hafnium compounds, Zirconium compounds.) (Tungsten, Impregnation with Nickel, Zinc.) (Production, Manufacturing methods, Flame spraying, Electric arcs in Laboratory furnaces.) (Silicon compounds, Dioxides.) Graphite, Solid rocket propellants.

Plasma arc sprayed refractory coatings for rocket nozzle throats were evaluated. Apparatus and techniques were developed for arc-spraying. The spraying parameters investigated included powder particle size, moisture content, method of powder feed for uniform rate of feed, stand-off distance, and substrate temperature and preheating. Stresses set up by thermal expansion characteristics of the refractory coating materials were found to limit the size and shape which could be coated satisfactorily. Graphite was the most satisfactory material for the entrance and exit cones, with attention then directed to the evaluation of materials for arc-sprayed coatings on the throat insert where maximum heat and erosion effects are encountered. Investigations were carried out with nozzle throat insert coatings of Cr_2C_4, Al_2O_3, W, HfC, HfO_2, and a composite coating of W and ZrO_2. The composite coating of W-ZrO_2 was found to give a uniform coating with a composition in close agreement with the composition desired and controlled by the feed rates of the 2 separate powders. (Author)

AD-265 866 Div. 14, 8
(TIPTB/JAB) OTS price $3.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
ENCAPSULATING, POTTING, AND EMBEDDING MATERIALS FOR ELECTRONIC COMPONENTS AND MODULES. AN ANNOTATED BIBLIOGRAPHY,
comp. by George E. Owens, Aug 61, 35p. (Special bibliography no. SB-61-50; Rept. no. 3-77-61-14) (Contract AF 04(647)787)
Unclassified report

DESCRIPTORS: (*Bibliography, *Embedding substances, *Encapsulation.) (Electronic equipment, *Insulating materials, Electric insulation.)

This bibliography results from a search for information on materials used for encapsulating, potting, and embedding electronic components.

There are 97 references, arranged by title, with publication dates between January 1958 and August 1961. Following the references are indexes of authors and sponsors, journal sources, and report numbers. The following sources were consulted during the search: LMSC Technical Information Center card catalogs, Applied Science and Technology Index, 1958-1961, ASTIA Technical Abstract Bulletin, 1958-1961, Electrical Engineering Abstracts, 1958-1961, Engineering Index, 1958-1961, U.S. Government Research Reports, 1960-1961, and Pertinent journals, 1961. (Author)

AD-265 885 Div. 14
(TIPTM/BRW) OTS price $13.00

Narmco Industries, Inc., San Diego, Calif.
THE PROPERTIES OF COMPRESSION MOLDED GLASS FLAKE REINFORCED, RESIN COMPOSITES.
Rept. for 1 Apr 60-1 June 61, on Molded Glass Flake Reinforced Composites,
by Albert J. Luirette. 1 June 61, 1v. incl. illus. tables.
(Contract AF 33(616)7195, Proj. 7381)
(ASD TR 61-300) Unclassified report

DESCRIPTORS: (*Laminates, Reinforcing materials, Disks, Glass, Films, Plastics, Resins, Epoxy resins, Silicone resins, Electrical properties, Mechanical properties, Physical properties.)

Four molding compositions using glass flake as reinforcement were selected for study by means of a series of screening tests. The physical, electrical and mechanical properties of the compositions after compression molding into flat laminates were determined. Simple geometric shapes such as a hemisphere were compression molded from these compositions. The properties of the simple shapes were compared to the properties of the flat laminates. Movement of the resin-flake mixture in the molds resulted in very poor alignment of the flakes within the molding resulting in significantly reduced mechanical properties. It was concluded that this problem is inherent to presently available glass flake reinforced molding compounds and will prohibit the satisfactory compression molding of everything but extremely simple shapes such as flat plates using available molding compounds and molding techniques. (Author)

AD-265 929 Div. 14
(TIPTM/BRW) OTS price $7.60

Narmco Industries, Inc., San Diego, Calif.
ESTABLISHMENT OF THE POTENTIAL OF FLAKE REINFORCED COMPOSITES AS ENGINEERING STRUCTURAL MATERIALS.
Summary technical rept., 1 July-1 Oct 59,
by Leonard P. Suffredini and Dennis W. Stevens.
Oct 60, 79p. incl. illus. tables.
(Contract NOa(s) 59-6255-c)
Unclassified report

DESCRIPTORS: (*Laminates, Plastics, Epoxy resins, Reinforcing materials, Disks, Glass, Films, Tensile properties, Stresses, Deformation, Mathematical analysis.) (Disks, Stainless steel, Laminates, Stresses.)

The stress-strain behavior of highly idealized model flake composites, composed of disc shaped flake of uniform size and mechanical properties, was considered. An analysis of such a composite under a uniaxial tensile stress was performed, considering the reinforcing elements to act independent of their nearest neighbors. This analysis was then modified to consider interactions between adjacent flakes. For the case where the flakes act independently of one another, the results show that the upper limit of strength available is only approximately 48% of the inherent strength of the reinforcement. A consideration of flake interaction reveals that a larger fraction of the reinforcement strength can be developed under load. Techniques for making disc shaped glass flake are given and the limitations of the methods are discussed. Methods for improving the reinforcement efficiency of the flake by altering the geometrical shape from a simple disc to a lenticular form are also considered. (Author)

AD-265 943 Div. 14
(TIPTM/GEC) OTS price $16.50

Materials Research Corp., Yonkers, N.Y.
NON-METALLIC FIBROUS REINFORCED METAL COMPOSITES.
Status rept.,
by E. S. Machlin. Sep 61, 243p. incl. illus. tables, 100 refs.
(Contract Now 61-0209-c)
Unclassified report

DESCRIPTORS: (Textiles, Synthetic fibers, Glass textiles, Ceramic fibers, Metallic textiles, *Reinforcing materials, *Metals, Mechanical properties, Tensile properties, Stresses, Deformation, Filaments, Manufacturing methods, Impregnation, Casting, Extrusion, Metal coatings, Coatings, Single crystals.)

The literature on fibers and fiber reinforced composites was reviewed and evaluated. It was concluded that, in principle, non-metallic fiber reinforced metals can have the largest strength/weight and modulus/weight ratios of all known materials, exceeding the values of those presently available by many factors, particularly at elevated temperatures. In practice, realization of the potential has been frustrated by two factors (1) thermal degradation of fiber strengths; and (2) inadequate fabrication procedures. The inadequacies of fabrication techniques employed to date were considered in detail and the requirements for an adequate fabrication technique are listed. (Author)

AD-266 017 Div. 14
(TIPTM/TCG) OTS price $1.10

General Electric Co., Evendale, Ohio.
HIGH STRENGTH GLASS FIBERS DEVELOPMENT PROGRAM.
Monthly progress rept. no. 3, 15 Sep-15 Oct 61,
by D. L. Hollinger, H. T. Plant, and T. J. Jordan. 25 Oct 61, 5p.
(Contract NOw 61-0641-c)
Unclassified report

DESCRIPTORS: (*Glass textiles, Glass, Fibers, Production, Manufacturing methods.) (Melting in Platinum alloys, Crucibles, Drying ovens, Controlled atmospheres by Plastics, Protective coverings.) (Drawing (Machine processing), Tensile properties, Test methods.) Mechanical properties.

The furnace for producing resin coated glass monofilaments in controlled atmosphere was completed. The spooler mechanism is in the final stages of construction, and equipment for winding

test rings has been built. These are being tested and assembled. Extension of facilities and provisions for maintaining an inert dry atmosphere constitute the principle remaining setup work. The split mandrel will be utilized for testing filament wrapped rings rather than the NOL test. (Author)

AD-266 054 Div. 14, 22
(TIPTM/EJH) OTS price $1.60

Mellon Inst. of Industrial Research, Pittsburgh, Pa.
BALLISTIC PROTECTIVE BUOYANT MATERIALS.
Quarterly rept. no. 6, 1 Apr-30 June 61, by M. C. Jaskowski. 24 Oct 61, 13p. incl. illus.
(Contract N140(138)68879B)
Unclassified report

DESCRIPTORS: (Fibers, *Synthetic fibers, Textiles, Dacron, *Orlon, *Nylon, Resins, Acrylic resins, *Buoyant materials, Cleaning, Flotation, Terminal ballistics.) (*Body armor, Materials, Terminal ballistics.) (Cleaning fluids, Detergents, Effectiveness.)

Effective removal of oil contaminate from commercially-prepared hydrophobed 1.0 denier Orlon staple batts was accomplished without detrimentally affecting the water-repellency. Dry cleaning with perchloroethylene and aqueous cleaning with a detergent were equally efficacious. The relative buoyancies of the fibers investigated are 0.5 dpf Acrilan more than 1.0 dpf Acrilan more than 1.0 dpf Orlon more than 1.0 dpf Acrilan more than 1.5 dpf Dacron. The conventional nylon armor was subjected to the modified ballistic test over a range of initial projectile velocities from 1200-1700 ft./sec. Even at velocities approaching 1600 ft./sec., the nylon was capable of reducing the initial projectile velocities by 30%. A comparison of the ballistic curves for 1.0 dpf and 0.5 dpf Acrilan fiber batts indicated a superiority of the finer fibers. (Author)

AD-266 064 Div. 14
(TIPTM/GEC) OTS price $2.60

Narmco Industries, Inc., San Diego, Calif.
RESEARCH AND DEVELOPMENT OF HIGH TEMPERATURE STRUCTURAL ADHESIVES.
Summary rept. 1 Aug 59-29 Sep 61, by Harold H. Levine. 29 Sep 61, 22p. incl. illus. tables.
(Contracts NOrd-19075 and NOw-61-0254-c)
Unclassified report

DESCRIPTORS: (High temperature research, *Adhesives, Sealing compounds, Heat resistant polymers, Metals, Phenolic resins, Epoxy resins, Silicone resins, Oxidation, Tests, Tensile properties, Heat treatment, Shear stresses, Mechanical properties.) (Laminates, Binders, Resins, Pyrolysis.) (Rocket cases, *Filament wound construction, Adhesives.)

Studies are being made of adhesives and laminating resins for potential use at 700 to 1000 F for periods up to 1 hour. Several adhesive systems are described for exposures up to 10 min at 1000 F on 17-7 stainless steel. One side benefit was an adhesive capable of good tensile shear strength for 250 hr at 500 F on steel and fair strength after 1000 hr at this temperature; one unusual characteristic is virtually no loss in strength from 500 to 1000 hr. The most heat stable laminating resins were either phenolic or silicone-phenolic (phenyl silane). Unlike the adhesives, the geometry of the reinforcement was important in determining the useful life of the composite. Definite potential was found for 2 commercial binder systems for high temperature resistant filament winding applications such as rocket motor cases. Pyrolysis of laminates at 1800 F, in Ar, resulted in significant increases in the oxidation resistance of laminates. In addition, such configurations became good semiconductors. This process did not produce graphite because of the low temperature used, but resulted in what were believed to be polynuclear hydrocarbon polymers. (Author)

AD-266 099 Div. 14, 19, 20
(TIPTM/REB) OTS price $1.60

Boeing Co., Seattle, Wash.
EFFECT OF NUCLEAR RADIATION OF GYRO FLUIDS.
by Howard L. Steele. 21 Oct 58, 12p. illus.
(Document no. D2-2753)
Unclassified report

DESCRIPTORS: (Inertial guidance, *Gyroscopes, Flotation, *Fluids, *Lubricants, Radiation effects, Nuclear power plants, Nuclear explosions, Gamma rays, Neutrons.) (Fluids, Lubricants, *Silicones, Polymers, Fluorides, *Vinyl chlorides.) (Friction, Density, Viscosity, Infrared spectroscopy, Absorption, Measurement, Determination.)

Typical fluids used to float the gyro in new low-drift gyros for inertial guidance are affected by nuclear radiation. Dow Corning Silicone DC-200 (200 and 350 centistoke viscosity) and Hooker Fluorolubes grades FS, S, and FC 43 were exposed either to Cobalt-60 gamma rays at the Boeing gamma facility or to a fission spectrum of pulsed neutrons at the Los Alamos Godiva facility. The viscosity was the most sensitive property measured and the denser fluid showed the greatest change. A 10% increase occurred in 350 centistoke DC-200 at a dose of 4 x 10 to the 15th power gammas/sq cm or 12.5 x 10 to the 13th power neutrons/sq cm. The reduction in density at these doses was not much more than the experimental error (about 1%). Changes in the IR transmission spectra were barely greater than the experimental error for doses below those which produced a gel. If the density changes noted occurred in a short time, the gyro would not be able to take the change into account and drift greater than specified would result. (Author)

15. MATHEMATICS

AD-265 549 Div. 15
(TIPTP/MFA) OTS price $3.60

Research Triangle Inst., Durham, N. C.
HAZARD ANALYSIS,
by G. S. Watson and M. R. Leadbetter. 28 Aug 61, 32p. illus.
(Contract Nonr-342300; In cooperation with Toronto U.)
Unclassified report

DESCRIPTORS: (*Hazards, Analysis, *Life expectancy, *Distribution, Reliability.) (Sequential analysis, Statistical functions, Sampling, Probability, Integrals, Polynomials.)

The hazard or conditional failure h(x) equals f(x)/(1-F(x)) of a life-distribution which has the same role in reliability studies as the spectral density-function in stationary time series analysis is studied. There are many situations where the most revealing analysis of the data is the non-parametric estimation of h(x). The study of this approach to reliability is examined. (Author)

AD-265 563 Div. 15
(TIPTP/MFA) OTS price $3.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
ON THE DECOMPOSITION OF SWITCHING FUNCTIONS.
Technical rept. on Mathematics,
by Sze-Tsen Hu. June 61, 28p. incl. tables.
(Rept. no. 6-90-61-15)
Unclassified report

DESCRIPTORS: (Functions, *Switching circuits, *Matrix algebra, Operators (Mathematics), Complex variables.) Tables.

A given switching function of n variables can frequently be decomposed into a composite function of several essentially simpler switching functions. Such decompositions lead to designs of more economical switching circuits to realize the given switching function. Ashenhurst's chart method is generalized to nondisjunctive decompositions by means of the don't care conditions. This extension provides an effective method of constructing all decompositions of switching functions. (Author)

AD-265 732 Div. 15
(TIPTP/JD) OTS price $2.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
THE MATHEMATICAL PROCESSING OF OBSERVATIONS. CHAPTER 3. ESTIMATING THE ERROR IN A FUNCTION WITH APPROXIMATE ARGUMENTS,
by B. M. Schigolev. 3 Oct 61, 19p. (Trans. no. MCL-1351 of Matematicheskaya Obrabotka Nablyudeniy, Moscow, pp. 34-48,
Unclassified report

DESCRIPTORS: (Experimental data, Mathematical analysis, *Functions, *Trigonometry, Numerical analysis, Errors.) (Translations, USSR.)

Contents:
Maximum errors in a function with one independent variable
Errors in the simplest elementary functions
The functions sin x and cos x
The functions tan x and cot x
Determination of the angle according to the trigonometric function
Powers and roots
Logarithms and exponents
The logarithms of the trigonometric functions
Determining the angles from the logarithms of the trigonometric functions
The error in a function with several arguments

AD-265 983 Div. 15, 25
(TIPTP/MFA) OTS price $1.60

California U., Berkeley.
SIMPLIFICATION OF THE TWO-BODY UNITARITY RELATION,
by Marcel Froissart. 1961, 14p.
(Contract AF 49(638)327)
(AFOSR-1176) Unclassified report

DESCRIPTORS: (*Relativity theory, *Perturbation theory, Transformations (Mathematics) of Data by Integral transforms, Functions, Polynomials.)

A reduction is obtained in the number of integrations needed to compute the scattering amplitude from a potential by dispersion-theoretical methods. (Author)

AD-266 015 Div. 15
(TIPTP/JDP) OTS price $3.60

Wisconsin U., Madison.
TRANSFORMATION OF THE INDEPENDENT VARIABLES,
by C. E. P. Box and Paul William Tidwell. June 61, 36p. incl. illus. tables, 14 refs. (Technical rept. no. 3)
(Contract Nonr-120217, Proj. NR 042 222)
Unclassified report

DESCRIPTORS: *Functions, *Transformations (Mathematics), Polynomials, Vector analysis.

Experimental work is concerned with the study of a response function N = E(y) = f(x,o) where x are the levels of k variables and o is a set of p parameters. The objective is usually to check the adequacy of the assumed functional form, to estimate the values of the parameters o and hence the response E(y) at any chosen x, and to obtain measures of precision for the estimates. In the present investigation, the errors in the y's are at least approximately normally and independently distributed with constant variance, and concentration is on finding transformations in the x's to reduce the function in these transformed variables to as simple a form as possible. Although not limited to this application, the method is perhaps of most general use when the true form f(x, o) of the response function is unknown. This is represented by a graduating function. (Author)

AD-266 051 Div. 15
(TIPTP/MFA) OTS price $6.60

Maryland U., College Park.
MANAGEMENT SCIENCES RESEARCH GROUP.
Technical rept. no. 1,
by R. Syski. Apr 61, 66p. 42 refs.
(Contract Nonr-59513)
Unclassified report

DESCRIPTORS: (Management engineering, *Telephone communication systems, *Numerical analysis, Programming, Number theory, Nonlinear systems.) (Equations, Operators (Mathematics), Matrix algebra.) Tables, *Bibliography.

The properties of feasible solutions concerned with optimization procedures are presented in Part I. The mathematical formulation of the problem is presented and theoretic properties of the coefficients in the grading equations are given. It is shown that several restrictions imposed in practice on gradings have interesting theoretical justification (e.g. number of groups,

factorization). The classical method of finding the solution has its origin in the famous Number Theoretic procedure dated back to sixth century. In Part II, various methods for the determination of the optimum grading (aiming to reduce the labor as compared with classical method) are described. It is found that the rule of smooth progression does not determine the optimum grading uniquely, examples of non-uniqueness are given and some conditions for uniqueness are stated. It is observed that the published grading Tables do not list the alternative optimum solutions, and on several occasions the entries in Tables are not optimal in the sense of the rule of smooth progression. Concluding remarks on standard methods of mathematical programming and on earlier grading methods proposed in literature are stated. (Author)

16. MEDICAL SCIENCES

AD-265 501 Div. 16
(TIPSB/CW) OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
CLINICAL CORRELATIONS AND SYSTEMIC STATUS IN PERIODONTAL DISEASE,
by Timothy J. O'Leary, Ira L. Shannon, and John R. Prigmore. Aug 61, 9p. incl. illus. tables, 42 refs. (Rept. no. 61-98)
Unclassified report

DESCRIPTORS: *Mouth, *Diseases, Etiology, Dental plaques.

Clinical and laboratory studies were carried out on 59 experimental and 64 control subjects. In the clinical evaluation, the periodontal score was significantly (P less than .01) correlated with the calculus score, the plaque score, and the mobility score. Correlation coefficients were .86, .68, and .73, respectively. Of all the serum constituents studied, only the free 17-OHCS levels were significantly different between experimental and control subjects. This adrenocortical hyperactivity may represent an anticipatory reaction, particularly since no steroid differences were found that could be correlated with the degree of periodontal breakdown. Results obtained in tests of oral glucose tolerance should be interpreted with utmost caution because of the many frailties of the procedure. Generally speaking, the method is suitable only for the diagnosis of established diabetes mellitus and should not be used to study less marked alterations in carbohydrate metabolism. (Author)

AD-265 502 Div. 16
(TIPTB/MS) OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
INTRA-AURAL TEMPORARY THRESHOLD SHIFT DIFFERENCES,
by Daryle L. Waldron and Richard C. McNee. Aug 61, 5p. incl. illus. tables. (Rept. no. 61-95)
Unclassified report

DESCRIPTORS: (*Ear, *Auditory thresholds, Measurement, Noise.)

A study is described which attempts to answer the following inquiry: Do the left and right ears of an individual experience the same degree of threshold shift, and recover at the same rate, when subjected to white noise of relatively high intensity levels. Results indicate that the answer is in the negative. (Author)

AD-265 518 Div. 16
(TIPTB/CW) OTS price $1.10

Army Medical Research and Nutrition Lab., Denver, Colo.
THE INFLUENCE OF ENZYME SUPPLEMENTATION ON THE DIGESTIBILITY OF ALGAE,
by Gilbert A. Leveille, Howerde E. Sauberlich, and Joseph A. Edelbrock. 20 June 61, 6p. incl. tables, 10 refs. (Rept. no. 259)
Unclassified report

DESCRIPTORS: *Algae as Food, Diet, *Enzymes, Additives, Digestive system.

Several amylolytic enzymes and enzyme preparations were added to diets in which algae served as the sole protein source. Digestibility of the dietary nitrogen by young rats was determined. Of the enzymes tested, diastase and alpha amylase produced the greatest improvement, cellulase and Nopgro also improved digestibility. Hemicellulase and Hydralase PH were without effect. When the digestibility values were corrected for the non-protein nitrogen of algae, and the assumption made that this nitrogen was unavailable, the protein of diets supplemented with diastase and alpha amylase was as digestible as casein. (Author)

AD-265 519 Div. 16
(TIPTB/MS) OTS price $4.60

Army Medical Research and Nutrition Lab., Denver, Colo.
FUNDAMENTAL PARAMETERS INFLUENCING THE ACCUMULATION AND ELIMINATION OF CARBON MONOXIDE BY ADULT HUMAN BEINGS,
by T. H. Allen and R. W. Allard. 1 Sep 61, 28p. incl. illus. tables, 31 refs. (Rept. no. 261)
Unclassified report

DESCRIPTORS: (*Carbon monoxide poisoning, Biochemistry, Blood chemistry, Test methods, Measurement, Mathematical analysis.) Physiology, Mathematical prediction.

The basis of a mathematical system for accumulation: elimination of carbon monoxide by human beings is described. The system can be solved by a person acquainted with algebraic methods, and one is able to predict the level of carboxyhemoglobin as a function of time from the initial level of carboxyhemoglobin, the concentration of inspired carbon monoxide and oxygen, expiratory flow rate, total body hemoglobin, and total pressure of gas breathed. These findings suggest that future physiological investigations, using carbon monoxide as a

tracer, should include the measurement of further parameters than often included to date. Examples are given of the method of calculation, and this is used to illustrate the importance of each parameter. Although scarcely any data are available on elimination of carbon monoxide, it is further shown how the system may predict the rate of elimination, especially when using the newest method of treating carbon monoxide poisoning by means of artificial ventilation with pure oxygen at a total ambient pressure of two atmospheres. (Author)

AD-265 520 Div. 16
(TIPTB/MS) OTS price $4.60

Army Medical Research and Nutrition Lab., Denver, Colo.
NUTRITIONAL EVALUATION OF A NORMAL MILITARY POPULATION,
by C. Frank Consolazio, Ralph Shapiro and others. 14 Aug 61, 32p. incl. illus. tables, 36 refs. (Rept. no. 260)
Unclassified report

DESCRIPTORS: (*Military personnel, *Anthropometry, *Nutrition, Biochemistry, Measurement.) Public health.

Studies were conducted at four military installations including Fitzsimons General Hospital, Fort Carson, Lowry Air Force Base and Buckley Naval Air Station. Information on age, heights, body weights, blood pressures and skinfold thickness measurements at four sites, were collected on 4174 enlisted men. In addition, chemical analyses were performed on approximately 800 bloods and urines. Blood analyses included hemoglobin, hematocrits, plasma proteins, vitamin C, vitamin A, carotene, total cholesterol, total lipids and phospholipids. In the urine the vitamin excretions of thiamine, riboflavin and N(1)methylnicotinamide were computed per gram of creatinine excreted. Data were summarized by age groups and compared to the ICNND and other normal standards. (Author)

AD-265 801 Div. 16
(TIPTB/CCH) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
BIONICS - A NEW SCIENCE,
by L. Zotova and A. Voskresenskiy. 4 Oct 61, 6p. (Trans. no. FTD-TT-61-38 of Izvestiya, col. 1, 2 and 3:pp. 2, 16 July 61)
Unclassified report

DESCRIPTORS: (*Scientific research, *Translations, USSR.) (*Biology, Brain, Ultrasonic radiation, Ultrasonics, Neuromuscular transmission.) (Laboratory animals, Bats, Electronics.) Cybernetics.

AD-265 892 Div. 16
(TIPTB/CCH) OTS price $1.60

Naval Medical Research Inst., Bethesda, Md.
VENOUS PRESSURE IN THE RABBIT FOOT BEFORE AND AFTER FREEZING INJURY,
by Esther Hardenbergh, Robert Coniff, and J. B. Roberts. 28 June 61, 16p. incl. illus. tables, 24 refs. (Rept. no. 3)
(Proj. no. MR 005.01-0021.01)
Unclassified report

DESCRIPTORS: (*Blood pressure, Veins, Pressure in Laboratory animals after Freezing, Injuries, *Frostbite.)

Venous pressure measurements have been made in small veins in rabbits' hind feet before and after local freezing injury. Before freezing, venous pressures are usually between 10 and 20 cm. H2O. Increases above this base-line may be seen, however, which may rise as high as 30-40 cm. H2O. These changes may occur either spontaneously, presumably in relation to body temperature variations, or in response to painful stimuli. In both instances the increases in venous pressure are accompanied by increases in surface skin temperature in the feet. Venous pressure response to intrajugular injections of epinephrine are variable and may show: (a) a decrease with carotid pressure increase; (b) no change; or (c) an increase after the peak carotid pressure has passed. After the foot has been frozen and thawed, venous pressures rise to levels exceeding the colloid osmotic pressure of the blood, sometimes as high as 80 cm. H2O; and the response to intrajugular epinephrine injection is an increase which follows directly the increase in carotid blood pressure, indicating a loss in vasoconstrictor activity of the vessels in the injured area. These findings are consistent with the development of the gross edema which develops after freezing injury. (Author)

AD-265 893 Div. 16
(TIPTB/CCH) OTS price $1.10

Naval Medical Research Inst., Bethesda, Md.
HEAT STRESS DURING OPERATION BANYAN TREE I. Final rept.,
by David Minard, George A. Grayeb, Jr. and others. 14 July 61, 9p. incl. illus. tables, 15 refs. (Rept. no. 5)
(Proj. no. MR 005.01-0001.01; In cooperation with Georgetown U.)
Unclassified report

DESCRIPTORS: (*Stress (Physiology), Heat, Armed forces maneuvers, Medical examination, Heart, Body temperature, Urine, Dehydration, Measurement.)

In Operation Banyan Tree I, 1500 unacclimatized paratroopers were flown from Fort Bragg, North Carolina, to Panama where they parachuted and engaged in a strenuous 2-day combat exercise against seasoned Army units stationed in Panama. Measurements of body weight, pulse rate, oral temperature, urine volume, urine specific gravity, and urinary electrolytes were made on a test squad of ten men on two successive days before the operation, once during the flight to Panama, on both days of the exercise, and finally one week after its return to Fort Bragg. Results indicated that these physically fit but unacclimatized men experienced significant degrees of dehydration, accompanied by reduced urinary volume, and depletion of urinary electrolytes, as well as elevation of oral temperature and resting pulse rate. Clinical symptoms of muscle cramps in one subject together with low urinary electrolytes in all subjects suggests the presence of marginal salt deficiency. In comparing them with control subjects, observers noted serious impairment of combat efficiency. (Author)

AD-265 931 Div. 16
(TIPTB/CW) OTS price $10.50

Ohio State U. Research Foundation, Columbus.
PHYSIOLOGICAL AND PATHOLOGICAL EFFECTS OF MECHANICAL VIBRATION ON ANIMALS AND MAN.
Progress rept., pt. 1, 1 July 60-31 Aug 61,
by William F. Ashe. Sep 61, 139p. incl. illus. tables, 71 refs. (Rept. no. 862-4)
Unclassified report

Original contains color plates; All ASTIA reproductions will be in black and white. Original may be seen in ASTIA Hq.

DESCRIPTORS: (*Man, *Laboratory animals, *Vibration, Physiology and Pathology on Metabolism, Pregnancy, Blood pressure, Blood circulation, Motor reactions, Oxygen consumption, Respiration, Galvanic skin response.)

Contents:
Rat studies: Metabolic and growth responses of unrestrained rats to repeated exposures of vibration, and effects of vibration on pregnant rats
Dog studies: General responses of dogs to whole-body vibration; blood pressure responses to whole-body vibration in anesthetized dogs; and blood flow in arteries of vibrated animals
Human studies: Human psychomotor performance during prolonged vertical vibration; oxygen consumption during human vibration exposure; respiratory frequency, tidal volume, and respiratory minute volume in human subjects exposed to vertical whole-body vibration; skin resistance (psycho-galvanic response) during whole-body vibration; body surface responses of standing male subjects subjected to vertical vibrations; occupational Raynaud's phenomena due to vibrating tools; and detection, recognition and identification of visual forms as a function of target size and whole-body vibration

AD-265 976 Div. 16, 4
(TIPTB/CCH) OTS price $1.60

BostonU., Mass.
THE EFFECT OF SELECTED PHYSICAL PARAMETERS ON THE TRANSFER THROUGH BIOLOGICAL MEMBRANES OF COMPOUNDS OF VARYING CHEMICAL TYPES.
Final rept. 1 Sep 60-31 Aug 61,
by Ruth R. Levine. 10 Nov 61, 12p. incl. illus. tables.
(Contract DA 18-108-405-cml-902)
Unclassified report

DESCRIPTORS: (*Phospholipids, *Absorption, Measurement, Mathematical analysis.) (*Biochemical tests, Tissues (Biology), Laboratory animals, Experimental data.) (Metabolism, *Metabolic products, Chemicals.) (*Biochemistry, Amines, Peptides.)

A phospholipide material extracted from gut, the phosphatido-peptide fraction, has been found to markedly increase the in vivo absorption of a quaternary ammonium compound. While the role of the phosphatido-peptide fraction in the mechanism of transfer of the cation across the gastrointestinal epithelium has not been established, the results of these studies are encouraging and are compatible with the hypothesis that endogenous anions play a carrier-role in the transport of exogenous cations such as the quaternary ammonium ions. The in vitro preparation developed for the determination of rate and degree of transfer of compounds across the gut wall seems particularly well suited to the collection of quantitative data under rather rigidly controlled conditions. The coordination and correlation of results of in vitro studies with those of in vivo studies will permit the determination of the validity of the former in and their applicability to the situation that exists in the intact animal. (Author)

AD-265 984 Div. 16
(TIPTB/CW) OTS price $1.60

Connecticut U., Storrs.
ISOLATION OF CHARACTERIZATION OF WTIHANIA SOMNIFERA ALKALOIDS.
Annual rept. 1 Sep 60-31 Aug 61,
by Arthur E. Schwarting. 30 Sep 61, 10p. incl. illus.
(Grant no. DA-CML-18-108-61-G-1)
Unclassified report

DESCRIPTORS: (*Plants, Tropical regions, *Alkaloids, Separation, Chemical properties, Synthesis.)

AD-266 007 Div. 16, 29, 20
(TIPTB/CW) OTS price $11.00

Walter Reed Army Inst. of Research, Washington, D. C.
THE WALTER REED WHOLE BODY COUNTING FACILITY. DETAILS OF CONSTRUCTION. GAMMA RADIOACTIVITY IN PEOPLE AND FOODSTUFFS. JULY 1958 TO JULY 1960,
by Kent T. Woodward, Charles L. Randolph, Jr. and others. July 60, 150p. incl. illus. tables, 33 refs.
Unclassified report

DESCRIPTORS: (*Radioactivity of *Gamma rays in *Man and *Food, Counting methods, Scintillation counters, Gamma ray spectrometers, Radiochemistry laboratories, Determination.)

Because of the inherent difficulties in the low-level assays of large numbers of bulk samples and the uncertainties in estimating total body burden from excretion levels, a facility for determining gamma-ray activity directly in humans was constructed during 1957 at the Walter Reed Army Institute of Research. This facility includes a large NaI crystal gamma-ray spectrometer and a 4-pi liquid scintillation counter. This location was selected because of population density, and a large hospital complex ensured the use of the facility in clinical medicine and metabolic research. The experiences and techniques of whole body counting are described. (Author)

AD-266 066 Div. 16, 28
(TIPTB/CW) OTS price $1.60

Naval School of Aviation Medicine, Pensacola, Fla.
PERCEPTION OF THE HORIZONTAL OR VERTICAL WITH HEAD UPRIGHT, ON THE SIDE, AND INVERTED UNDER STATIC CONDITIONS AND DURING EXPOSURE TO CENTRIPETAL FORCE,
by Ashton Graybiel and Brant Clark. 1961, 13p. incl. tables, 13 refs. (Rept. no. 60)
(Proj. no. MR005.13-6001; NASA Grant no. R-1)
Unclassified report

DESCRIPTORS: (Man, Rotation, Centrifuges, Physiology, *Optical illusions, *Proprioception, Ear, *Vertical perception, *Visual perception.)

The present experiment attempted to measure the accuracy of visual egocentric localization in widely different body (head) positions and the change in localization induced by a change in direction of the gravitational-inertial force environment. The ability of five healthy subjects to set a luminous line to the horizontal while in the dark was measured with head upright, on the side, and inverted both under static conditions and during exposure to centripetal force. In general, the findings were the same for all subjects and interindividual differences did not affect any of the major findings significantly. Under static conditions egocentric visual localization was quite accurate with head upright, inaccurate with head inverted, and grossly in error with head on the side. When the subjects were exposed to centripetal force with a change in direction of force making an angle of 6 degrees or 12 degrees, the oculogravic illusion was perceived with head erect, not exhibited with head inverted, and not measurable with head on the side. The significance of these findings is discussed with reference to the function of the otolith apparatus and other factors. (Author)

AD-266 076 Div. 16, 30
(TIPTB/CCH) OTS price $7.60

Armed Forces-NRC Committee on Bio-Astronautics, Washington, D. C.
HUMAN ACCELERATION STUDIES,
by George Bates, Carl C. Clark and others.
1961, 71p. incl. illus. tables, 144 refs.
Unclassified report

DESCRIPTORS: (*Indexes, *Vocabulary, *Acceleration tolerance, *Acceleration, Space medicine, Test equipment, Centrifuges.)

This report includes:
National Aeronautics and Space Administration, Washington, D. C.
A BIBLIOGRAPHIC INDEX FOR CATALOGING THE ACCELERATION LITERATURE, by George Bates. 1961.

Aviation Medical Acceleration Lab., Naval Air Development Center, Johnsville, Pa.
A PROPOSED PHYSIOLOGICAL ACCELERATION TERMINOLOGY WITH AN HISTORICAL REVIEW, by Carl C. Clark, James D. Hardy, and Richard J. Crosbie. 1961.

Bio-Science Div., Office of Assistant for Bio-Astronautics, Air Force Systems Command.
ACCELERATION ENVIRONMENTS PERTINENT TO AEROSPACE MEDICAL RESEARCH, by Rufus R. Hessberg. 1961.

AD-266 077 Div. 16, 30
(TIPTB/CCH) OTS price $5.60

Armed Forces-NRC Committee on Bio-Astronautics, Washington, D. C.
REPORTS ON HUMAN ACCELERATION,
by Edwin P. Hiatt, J. P. Meehan, and Robert Galambos. 1961, 55p. incl. tables, 34 refs.
(Publication no. 901)
Unclassified report

DESCRIPTORS: *Reports on *Acceleration tolerance and Man, Safety of Stress (Psychology), Stress (Physiology), Pathology, Injuries, Physiology, Visual thresholds, Visual perception, Sensory perception, Tests, Test methods.

This report includes:
Ohio State U. School of Medicine, Columbus.
PRINCIPLES OF SAFETY MONITORING OF HAZARDOUS RESEARCH ON ACCELERATION UTILIZING HUMAN SUBJECTS, by Edwin P. Hiatt. 1961.

University of Southern Calif., Los Angeles.
SUBJECTIVE ENDPOINTS IN ACCELERATION EXPERIMENTS, by J. P. Meehan. 1961.

Walter Reed Army Medical Center, Washington, D. C.
PSYCHOLOGICAL TESTING OF SUBJECTS UNDERGOING ACCELERATION STRESS, by Robert Galambos. 1961.

AD-266 078 Div. 16
(TIPTB/CCH) OTS price $10.50

Armed Forces-NRC Committee on Bio-Astronautics, Washington, D. C.
MOTION DEVICES FOR LINEAR AND ANGULAR OSCILLATION AND FOR ABRUPT ACCELERATION STUDIES ON HUMAN SUBJECTS (IMPACT). A DESCRIPTION OF FACILITIES IN USE AND PROPOSED.
Special rept.
by Henning E. Von Gierke and Eugene Steinmetz.
1961, 132p. incl. illus. (Publication no. 903)
Unclassified report

DESCRIPTORS: (Test equipment and *Test facilities, Linear accelerators, Accelerators, Oscillators, Acceleration, Deceleration, Stress (Physiology), *Acceleration tolerance, Impact shock, Vibration on Man, Physiology.) (Motion sickness, Vertigo.)

17. METALLURGY

AD-265 546 Div. 17, 26, 1
(TIPTM/BRW) OTS price $5.60

Republic Aviation Corp., Farmingdale, N. Y.
IMPROVED METHODS FOR THE PRODUCTION OF TITANIUM ALLOY EXTRUSIONS.
Interim technical engineering rept. no. 18, 1 July-1 Oct 61,
by Murray H. Levine. Oct 61, 54p. incl. illus. tables.
(Contract AF 33(600)34098, Proj. 7-556)
(AMC TR 7-556, vol. 18) Unclassified report

DESCRIPTORS: (Airframes, Materials, *Titanium alloys, Aluminum alloys, Molybdenum alloys, *Extrusion, Manufacturing methods, Production, Processing, Lubrication, Glass, Coatings, Oxygen, Chemical reactions, Contamination, Heat treatment, Mechanical properties, Tensile properties, Surface properties, Hardness, Microstructure.)

Several Ti-7Al-4Mo alloy billets were individually glass coated with no. 85, 383A and A-40 glass to determine billet contamination at 1800 F for heat soak periods of 45 and 90 minutes. Results of visual micro-examination and of a microhardness survey indicate: (1) glass-Ti reactivity is less for the 383A glass composition, and (2) the greater part of O contamination occurs during the first 45 min of heating. Installation of the 100-kw induction heating unit at the Allegheny Ludlum draw bench facility has been completed. Twelve Tee sections 4 ft long were selected on the basis of dimensional uniformity and minimum surface contamination. These sections were chemically pointed, pickled and annealed in preparation for the first warm drawing trials. (Author)

AD-265 570 Div. 17, 26
(TIPTM/BRW) OTS price $2.60

Wah Chang Corp., Albany, Oreg.
FABRICATION OF WIDE TUNGSTEN SHEET BY POINT DEFORMATION TECHNIQUES.
Interim rept. no. 1, 1 July-30 Sep 61.
30 Sep 61, 17p. incl. illus.
(Contract NOw 61-1046-c)
Unclassified report

DESCRIPTORS: (Sheets, *Tungsten, Production, Manufacturing methods, Powder metallurgy, Sintering, Deformation, Forging, Rolling mills.)

Single point deformation, as a method of producing wide W sheet, is described and compared to conventional rolling. Prior experimental work by Wah Chang Corporation and Pratt & Whitney Aircraft is presented. This work has demonstrated the potential feasibility of the single point deformation method as it applies to W and other hard-to-work materials for the fabrication of sheet material. A sintered and forged W blank was flow turned from 0.250 to 0.018 in. thick without failure of any part of the material. (Author)

AD-265 603 Div. 17, 26
(TIPTM/BRW) OTS price $7.60

Crucible Steel Co. of America, Midland, Pa.
IMPROVED TITANIUM ALLOY SHEET (B120VCA).
Interim progress rept. no. 7, 1 July 59-30 Apr 60, on B120VCA Titanium Alloy Sheet Rolling Program,
by A. E. Leach and H. A. Clampett, Jr. 27 Apr 60, 72p. incl. tables.
(Contract NOa(s) 58-881-c)
Unclassified report

DESCRIPTORS: (Sheets, Wire, Foils, *Titanium alloys, Vanadium alloys, Chromium alloys, Aluminum alloys, Production, Processing, Rolling mills, Heat treatment, Mechanical properties, Tensile properties.) Manufacturing methods.

Progress is reported on the processing of B120 VCA Ti alloy sheet (gages 0.025, 0.040, 0.063, 0.090, 0.125), welding wire (1/32, 1/16, 3/16 in.-diam), ribbon wrap, and foil. Physical and mechanical property and H content data are presented for each item supplied to the various customers.

AD-265 617 Div. 17
(TIPTM/EJH) OTS price $1.60

Armour Research Foundation, Chicago, Ill.
COPPER-COOLED TUNGSTEN FIBER ROCKET NOZZLE MATERIALS.
Quarterly rept. no. 1, 1 July-30 Sep 61,
by T. J. Koppenaal and N. M. Parikh. 27 Oct 61, 15p. incl. illus. (Rept. no. ARF 2182-B2-27)
(Contract DA 11-022-505-ORD-3092, Proj. TB4-002)
Unclassified report

DESCRIPTORS: (*Rocket motor nozzles, Cooling, Thermal insulation, Insulating materials.) (*Tungsten, Tungsten alloys, *Copper alloys, *Nickel alloys, Heat resistant alloys, *Metallic textiles, *Fibers, Bonding, Density, Microstructure, Mechanical properties, Tensile properties, Manufacturing methods, Sintering.)

Cu and Cu-Ni alloys were used as a matrix of W fibers for the purpose of obtaining W-W bonding of the fibers. From the experimental results, the following conclusions are made: Maximum strength properties in 25% density composites made with 0.006 in. diam tungsten fibers were obtained by using a matrix of 90% Cu-10% Ni. Maximum strength properties in 75% density composites made with 0.001 in. diam W fibers were obtained by using a matrix of 95% Cu-5% Ni. Maximum strength properties in 75% density composites made with 0.002 in. diam tungsten fibers were obtained by using matrices of 90% Cu-10% Ni and 85% Cu-15% Ni. Another large increase was observed at 70% Cu-30% Ni, and this requires additional investigating. The strengthening mechanism in all of these cases presumably arises from a Ni-W or Ni-W-Cu bond between the W fibers. (Author)

AD-265 618 Div. 17, 26
(TIPTM/BRW) OTS price $1.60

Armour Research Foundation, Chicago, Ill.
ZONE REFINING OF CEMENTED TUNGSTEN-BASE ALLOYS.
Quarterly rept. no. 1, 1 July-30 Sep 61,
by N. M. Parikh. 27 Oct 61, 15p. incl. illus. tables (Rept. no. ARF 2182-27)
(Contract DA 11-022-505-ORD-3092, Proj. TB4-002)
Unclassified report

DESCRIPTORS: (Sheets, *Tungsten alloys, Production.) (Manufacturing methods, Powder metallurgy, Powder metals, *Tungsten, Nickel, Iron, Sintering, Plasticity, Plastic flow, Deformation by Rolling mills, Purification by Electron beams, *Zone melting in Vacuum furnaces.) (Mechanical properties, Microstructure, Grains (Metallurgy), Chemical analysis, Tensile properties.)

The resistance-heated zone-refining furnace was put into operation, and a 20-x 2-x 0.5-in piece of W was zone refined at 1900 C in vacuum. The initial experiments in making W sheet by the new process was successful. The initial steps of warm rolling of the liquid phase sintered alloys and zone refining conditions will govern the final properties of the hot-rolled sheet. Although the high-temperature tensile properties of the sheets made thus far are comparable to those of commercial sheets, the residual matrix content should be lowered to around 0.05% in order to obtain formable sheet. The gun life of the electron beam furnace was not affected by the zone refining of the sintered and warm-rolled bars. The sheets obtained were texture-free insofar as their mechanical properties were concerned. (Author)

AD-265 619 Div. 17, 10
(TIPTM/SEB) OTS price $1.00

Allied Chemical Corp., Hopewell, Va.
IMPACT SENSITIVITY OF METALS (TITANIUM) EXPOSED TO LIQUID NITROGEN TETROXIDE.
Rept. for Apr 60-Apr 61, on Finishes and Materials Preservation,
by H. F. Scott, Jr., C. W. Alley and others.
May 61, 27p. incl. illus. tables.
(Contract AF 33(616)7114, Proj. 7312)
(WADD TR 61-175) Unclassified report

DESCRIPTORS: (Impact shock, Sensitivity of *Titanium, *Titanium alloys, *Stainless steel with *Liquefied gases, Nitrogen compounds, Tetroxides, Adsorption, Tests.) (Molybdenum in Stainless steel.) (Ignition, Shear stresses, Friction, Sparks.) (Mechanical properties, Tensile properties, Diffusion.) (Metals, Deterioration, Corrosion, Preservation.)

The purpose of this investigation was to determine the impact sensitivity of commercially pure Ti, Ti alloy 6Al-4V, and precipitation hardened 15-7 Mo stainless steel when exposed to liquid N2O4. An explanation is given of the probable mechanism of the limited ignition resulting from impact. Commercially pure Ti and Ti alloy 6Al-4V ignite about 50% of the time when impacted with a 0.5-in.-diam flat striker having an energy of 200 ft-lbs. Storage of the commercially pure Ti in N2O4 decreases the energy needed for 50% ignition to 60 to 70 ft-lbs. The sensitivity of the alloy is unaffected by storage in N2O4. Precipitation hardened 15-7 Mo stainless steel was not impact sensitive in liquid N2O4. (Author)

AD-265 620 Div. 17
(TIPTM/EJH) OTS price $1.10

Armour Research Foundation, Chicago, Ill.
DUCTILE HIGH-TEMPERATURE TUNGSTEN ALLOYS.
Quarterly rept., 1 July-30 Sep 61 on Development and Application of a Theory for Plastic Deformation of Cemented Alloys,
by D. Weinstein and F. C. Holtz. 27 Oct 61, 8p. incl. illus. (Rept. no. ARF 2182-B1-27)
(Contract DA 11-022-505-ORD-3092, Proj. TB4-002)
Unclassified report

DESCRIPTORS: *Tungsten alloys, Thorium alloys, *Heat resistant alloys, Powder alloys, Powder metals, Sintering, High temperature research, Mechanical properties, Tensile properties, Deformation, Porosity, Microstructure.

A program for development of a high-temperature, liquid-phase sintered W alloy is being pursued. Th proved to be the most acceptable matrix base; initial results indicate that W-Th alloys are capable of room-temperature deformation and workability, possess good high-temperature strength, and have a melting point in excess of 2000 C. Effort is concentrated on reducing or eliminating porosity to improve room-temperature fabricability. The decomposition of thorium hydride during sintering resulted in less porosity. A W-15Th alloy was initially found to have compressive ductility equivalent to W-20Th. The elevated temperature workability characteristics of these compositions have been initially determined; at 1000 C, W-Th can be severely rolled or hammer-forged without occurrence of cracking. (Author)

AD-265 624 Div. 17
(TIPTM/BRW) OTS price $13.00

Battelle Memorial Inst., Columbus, Ohio.
HIGH-TEMPERATURE PROPERTIES AND ALLOYING BEHAVIOR OF THE REFRACTORY PLATINUM-GROUP METALS.
Special summary rept., 1 Apr 58-31 Aug 61,
by R. W. Douglass, C. A. Krier, and
R. I. Jaffee. 31 Aug 61, 170p. incl. illus. tables, 34 refs.
(Contract Nonr-254700, Proj. NR 039-067)
Unclassified report

DESCRIPTORS: (*Platinum, Palladium, Iridium, Osmium, Rhodium, Ruthenium, *Refractory materials, *Metals, Alloys, Mechanical properties, High temperature research.) (Preparation, Powder metallurgy, Sintering, Melting, Electron beams, Zone melting, Forging, Heat treatment, Chemical reactions.) (Tensile properties, Creep, Hardness, Stresses, Rupture, Tests.) (Crystals, Crystal structure, Microstructure, Single crystals.) (Oxidation, Reaction kinetics, Thermodynamics, Oxides, Oxygen, Diffusion, Adsorption.)

The results of 3 years study of the Pt-group metals are presented. The object of the program was to evaluate the high-temperature mechanical properties and alloying behavior of the refractory Pt-group metals. The published literature was reviewed to determine the specific metallurgical areas most lacking in information, and experimental programs were based on the survey results. Many problem areas of scientific and technological interest were defined. Chief among these was the unusually low ductility of rhodium and iridium. Other problem areas were related to the preparation and examination of experimental materials. These were studied to determine experimental techniques and to develop a state of the art of the consolidation, fabrication and examination of the refractory platinum-group metals. (Author)

AD-265 625 Div. 17, 12
(TIPTM/EJH) OTS price $2.75

Brush Beryllium Co., Cleveland, Ohio.
INVESTIGATION OF INTERMETALLIC COMPOUNDS FOR

VERY HIGH TEMPERATURE APPLICATIONS.
Rept. for 1 May 59-31 Oct 60, on Ceramic and Cermet Materials Development,
by Jonathan Booker, Robert M. Paine, and A. James Stonehouse. Apr 61, 133p. incl. illus. tables, 14 refs.
(Contract AF 33(616)6540, Proj. 7350)
(WADD TR 60-889) Unclassified report

DESCRIPTORS: (*Intermetallic compounds, *Refractory materials, *Cermets, Heat resistant alloys, Tantalum compounds or Hafnium compounds or Zirconium compounds, *Beryllium compounds and Molybdenum compounds or Tantalum compounds or Tungsten compounds, *Silicides, High temperature research.) (*Re-entry vehicles, Guided missiles, Materials.) Powder metals, Preparation, Phase studies, Mechanical properties, Impact shock, Thermal conductivity, Thermal expansion, Specific heat, Oxidation, Test methods, Test equipment.

Intermetallic beryllides from the systems Ta-Be, W-Be, and Hf-Be along with the disilicides of W, Ta, and Mo, were screened for compounds capable of serving as structural materials at temperatures above 2500 F. The compounds studied were TaBe12, Ta2Be17, Hf2Be21, MoSi2, TaSi2, and WSi2. An investigation of the rates of oxidation of intermetallic beryllides was initiated. The oxidation of TaBe12, Hf2Be21, ZrBe13, and Ta2Be17 in the range 2300 to 2750 F was found to obey an exponential rate law which was cubic or a higher power rate law. In most cases, the cubic rate law applied. The products of the oxidation of ZrBe13 at 2500 F were identified as Zr2Be17 and BeO. Tentative activation energies for a cubic rate process were calculated for TaBe12 and Hf2Be21. (Author)

AD-265 626 Div. 17, 32
(TIPTB/CW) OTS price $5.60

Defense Metals Information Center, Columbus, Ohio.
DEFENSE METALS INFORMATION CENTER SELECTED ACCESSIONS,
comp. by Virginia L. Frazier. Oct 61, 40p., 244 refs.
Unclassified report

DESCRIPTORS: (*Bibliography, *Metals, Alloys, Ceramics materials, *Refractory materials, Steel, Coatings.)

Contents:
High-strength alloys: Cobalt base; nickel base; engineering steels; iron base
Light metals: Beryllium; titanium; magnesium; silicon
Nonmetallics: Special refractories; ceramic oxide
Refractory metals: Columbium; molybdenum; rhenium; tantalum; tungsten
Miscellaneous: Coatings; applications; composites

AD-265 638 Div. 17, 25
(TIPTM/BRW) OTS price $1.60

Frankford Arsenal, Philadelphia, Pa.
COMPRESSIVE DEFORMATION OF MAGNESIUM SINGLE CRYSTALS,
by M. Schwartz. July 61, 17p. incl. illus. 10 refs. (Rept. no. R-1602)
(DA Proj. 599-01-004)
Unclassified report

DESCRIPTORS: (Single crystals, *Magnesium, Plasticity, Compression shock, Deformation, Creep, Lattices, Stresses, X-ray photography.)

A study was made of the lattice rotation and creep behavior of compressively stressed Mg single crystals. Pure Mg single crystal rods, having the same orientation but different height-to-diameter ratios, were deformed by compression. The resulting rotation of the crystalline lattice, measured by Laue back-reflection photographs, was accomplished by basal slip as the normal to the basal plane rotated toward the direction of the applied load. The rotation was dependent only on the orientation of the lattice with respect to the rod and the amount of deformation, in accordance with the model given by Schmid and Boas. (Plasticity of Crystals, Bath House, Picadilly W1: F. A. Hughes and Co., 1950.) Individual crystals were deformed discrete amounts and permitted to creep under stress relaxation. It was found that the creep contraction was proportional to the product of load and the cube root of the time, and was essentially independent of the previous history (Proc. Roy. Soc, Series A, 90:329-342, 1914) of the rod. This empirical relationship is similar to that of Andrade which applies to the primary stage of many tension creep tests. No tertiary stage was found in the compression tests for times up to 10,000 minutes. (Author)

AD-265 664 Div. 17, 26
(TIPTM/BRW) OTS price $2.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
TITANIUM AND ITS ALLOYS (TECHNICALLY PURE TITANIUM) (SELECTED PARTS).
by L. S. Moroz, B. B. Chechulin and others.
18 Sep 61, 27p. incl. tables, 36 refs. (Trans. no. MCL-997 of Titan i Ego Splavy, Tekhnicheski Chistyy Titan, Leningrad 1:pp. 458-461, 477-492, 1960)
Unclassified report

DESCRIPTORS: (*Titanium, *Welding, *Soldering. Arc welding, Welding fluxes, Welded joints, Slags, Hydrogen, Nitrogen, Oxygen, Absorption, Oxidation, Silver solders, Soldering alloys, Soldering fluxes, Metal coatings, Mechanical properties, Microstructure.) (Technological intelligence, Translations, USSR.) *Titanium alloys.

Contents:
Automatic submerged arc welding
Soldering of Ti
  Soldering with hard solders
  Soldering with soft solders
    Chemical coating of Ti with another metal
    Coating Ti by immersion in molted Sn
    Coating Ti with Sn by the method of Ar-arc facing
Soldering Ti to other metals

AD-265 667 Div. 17, 26
(TIPTM/BRW) OTS price $3.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
CERTAIN PROBLEMS OF THE TECHNOLOGY OF THE MELTING OF TITANIUM IN VACUUM ARC FURNACES,

by I. V. Polin and V. P. Urt'yev. 28 Aug 61, 30p. incl. tables (Trans. no. MCL-1011 of Metallurgiya, Sbornik Statey 2:236-250, 1959)
Unclassified report

DESCRIPTORS: (Titanium, *Titanium alloys, *Melting, Vacuum furnaces, Electric arcs, Gases, Chemical analysis, Hydrogen, Carbon compounds, Monoxides, Nitrogen, Oxygen.) (Technological intelligence, Translations, USSR.)

Contents:
Investigation of the composition of the gases liberated during vacuum arc melting of Ti
The effect of the number of vacuum arc remeltings on the mechanical properties and the gas saturation of Ti
Effect of the electrical conditions of a heat upon the solubility of the alloying additives and crystallization of the ingot
Determination of depth of liquid bath and equalization of alloying elements throughout the height and across the section of the ingot

AD-265 668 Div. 17
(TIPTM/BRW) OTS price $1.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
POSSIBILITIES FOR UTILIZATION OF SECOND-GRADE TITANIUM SPONGE,
by T. E. Mingin and S. M. Shul'kin. 28 Aug 61, 14p. (Trans. no. MCL-1013 of Metallurgiya, Sbornik Statey 2:294-302, 1959)
Unclassified report

DESCRIPTORS: (*Metal sponges, *Titanium, Mechanical properties, Processing, Melting, Deformation, Sheets, Titanium tubing, Metal plates, Hardening.) (Technological intelligence, Translations, USSR.)

Investigations of Ti produced from 2 lots of TG-2 sponge showed no significant difference in strength and ductility between the metal prepared from this sponge and that prepared from VT-1 Ti except for a noticeably lower ductility and higher notch sensitivity of Ti melted from TG-2 grade sponge. Cold-rolled and cold-drawn tubes of this Ti had a tensile strength of 72 kg/sq mm and an elongation per unit length of 17 to 19%. It was established that Ti from the sponge TG-2 was of good weldability. The strength of the welded seam always proved greater than that of the base metal. Melting, hot and cold plastic working of metal made from TG-2 sponge may be performed under the same regimes and conditions as those employed for VT-1 titanium. (Author)

AD-265 669 Div. 17
(TIPTM/REB) OTS price $3.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
METHOD OF MELTING ALLOYING ELEMENTS FOR TITANIUM ALLOYS,
by V. P. Urt'yev and B. M. Maksimov. 28 Aug 61, 36p. incl. tables (Trans. no. MCL-1012 of Metallurgiya, Sbornik Statey 2:251-268, 1959)
Unclassified report

DESCRIPTORS: (*Titanium alloys, Production, Melting, Vacuum furnaces, Electric arcs.) Aluminum, Boron, Chromium, Niobium, Copper, Iron, Manganese, Molybdenum, Tantalum, Tin, Titanium, Vanadium, Zirconium. (USSR, Technological intelligence, Translations.

The melting of Ti-base alloys is performed in vacuum arc furnaces in a water-cooled copper container. The remelting of the consumable press-formed electrode is the most popular method in the USSR and abroad. With this method of melting, an electric arc is struck between the consumable electrode and the stool. The lower face of the electrode is gradually fused, and the metal dripping onto the stool forms a molten bath. As the molten metal transfers from the electrode to the bath, its lower portion gradually crystallizes. The process of crystallization, therefore, always runs parallel to the process of melting. The depth of the liquid bath fluctuates in accordance with arc currents and container diameter, and varies between the limits of 50 and 300 mm. (Author)

AD-265 672 Div. 17
(TIPTM/EJH) OTS price $3.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
CONTRIBUTION TO THE QUESTION OF THE MECHANICAL STRENGTH OF FOIL,
by P. O. Pashkov and V. A. Bartukhina. 4 Aug 61, 34p. 14 refs. (Trans. no. MCL-1017 of Metallovedeniye, Sbornik Statey, Leningrad 3:214-229, 1959)
Unclassified report

DESCRIPTORS: (*Foils, *Metal films, Films, Sheets, Cylindrical bodies, Mechanical properties, Tensile properties, Deformation, Plasticity, Failure (Mechanics).) Steel, Stainless steel, Austenite, Copper, USSR, Technological intelligence, Translations.

The strength of thin metal foil in tensile tests is distinguished by a number of peculiarities because of the sharp difference in the course of plastic deformation in a thin flat specimen and in a standard cylindrical specimen and the technological methods of manufacturing foil. The plastic limit of the specimens of foil was considerably lower than that of normal cylindrical specimens of the same metal, because of the sharp decrease of the role of concentrated deformation in the total macroscopic elongation of the specimen. The susceptibility to a considerable uniform elongation is a valuable property of metal foil, determining the ultimate deformability of a thin-walled article under overloads. The deformability of foil specimens is characteristic by the possible formation of two superposed zones of concentrated deformation(necks). In the presence of phase transformations during plastic flow of a foil specimen, a substantial additional strain hardening develops. (Author)

AD-265 674 Div. 17, 26
(TIPTM/GEC) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
AN INVESTIGATION OF THE STRUCTURE AND PHASE COMPOSITION OF A SILICON DIFFUSION COATING FOR NIOBIUM,
by P. M. Arzhanyy, R. M. Volkova, and D. A. Proskoshkin. 28 Aug 61, 7p. (Trans. no. MCL-1023 of Issledovaniya po Zharoprochnya Splavam, Moskva 6:201-205, 1960)
Unclassified report

Division 17 METALLURGY

DESCRIPTORS: (Refractory materials, Metals, *Niobium, Corrosion inhibition, *Silicon coatings, Diffusion, Physical properties, Mechanical properties, Metallurgy, Radiography, Microstructure.) (Technological intelligence, Translations, USSR.)

An investigation was made of the structure and phase composition of technical Nb saturated with solid phase Si for 30 min to 15 hrs at temperatures of 1100 to 1300 C. The diffusion coating was analyzed by metallographic analysis and radiographic procedures, and an x-ray spectrum analysis was made. The microhardness was 1050 kg/sq mm. The weight gain increased exponentially as it was exposed to higher temperatures and greater duration of the saturation process. The parameters of diffusion of Si into Nb were computed. At saturation temperatures of up to 1300 C, phases of the following composition were developed on the surface of Nb: NbSi2, Nb5Si3, and Nb4Si.

AD-265 675 Div. 17, 2
(TIPTM/EJH) OTS price $1.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
THE EFFECT OF STRUCTURAL STABILITY UPON HEAT RESISTANCE,
by I. L. Mirkin and V. Z. Tseytlin. 28 Aug 61, 18p. 27 refs. (Trans. no. MCL-1027 of Issledovaniya po Zharoprochnym Splavan, Moscow 6:268-277, 1960)
Unclassified report

DESCRIPTORS: (*Heat resistant alloys, Creep, Deformation, Failure (Mechanics), Phase studies, Phase transitions, Transformations.) (Alloys, Crystals, Lattices, Diffusion, Crystal structure, Chemical bonds.) Steel, Cobalt alloys, Nickel alloys, Chromium alloys, Molybdenum alloys, Tungsten alloys, Temperature, High temperature research, USSR, Technological intelligence, Translations.

AD-265 676 Div. 17
(TIPTM/GEC) OTS price $1.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
INFLUENCE OF THE TIME FACTOR UPON THE COMPOSITION VERSUS HEAT RESISTANCE DIAGRAM OF ALLOYS OF THE FIVE-COMPONENT Ni-Cr-W-Ti-Al SYSTEM,
by I. I. Kornilov, L. I. Pryakhina, and O. V. Ozhimkova. 28 Aug 61, 10p. (Trans. no. MCL-1028 of Issledovaniya Po Zharoprochnym Splavam, Moskva 6:278-283, 1960)
Unclassified report

DESCRIPTORS: (*Heat resistant alloys, *Nickel alloys, Aluminum alloys, Chromium alloys, Titanium alloys, Tungsten alloys, Solutions, Solids, Mechanical properties, Physical properties, Deformation.) (Technological intelligence, Translations, USSR.) (Phase studies, Time.)

The maximum heat resistances in isothermic diagrams of composition versus heat resistance are dependent not only upon temperature but also upon test time. This maximum shifts toward the supersaturated solid solutions with increasing test time. For short-time service (not over several hundred hours), it is desirable to use the most highly alloyed heat-resistant alloys with more heterogeneity of structure, in which several excess phases come into being during special heat treatment procedures or in actual service. For long-term service (tens, hundreds and thousands of hours) at high temperatures, it is desirable to use high-alloyed heat-resistant alloys but with a lower degree of supersaturation of the solid solutions. Highly alloyed and hardened solid solutions, stable to heat and subject to no phase transformations in the solid state during the entire term of service of the material would constitute ideal heat-resistant alloys for long service. (Author)

AD-265 678 Div. 17, 26
(TIPSM/REB) OTS price $7.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
TECHNOLOGY OF THE PRODUCTION OF TUNGSTEN AND MOLYBDENUM (Tekhnologiya Polucheniya Vol'frama I Molibdena),
by G. I. Abashin and G. M. Pogosyan. 3 Oct 61, 79p. incl. tables (Trans. no. MCL-1048 of Gosudarstvennoye Nauchno-Tekhnicheskoye Izdatel'stvo Literatury Po Chernoy i Tsvetnoy Metallurgii, Moskva:pp. 6-14, 107-140, 114-153, 222-230, 1960)
Unclassified report

DESCRIPTORS: (*Tungsten, *Molybdenum, *Tungsten compounds, *Molybdenum compounds, *Molybdates, *Tungstates, *Molybdenum alloys, *Tungsten alloys, Production, Processing, Physical properties, Chemical properties, Electrical properties, Chemical reactions.) (USSR, Translations, Technological intelligence.) Particles, Powder metals, Powder metallurgy.

AD-265 680 Div. 17
(TIPTM/BRW) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
A COPPER ALLOY CONTAINING ZIRCONIUM AND RHENIUM,
by A. S. Gladkov, Ye. I. Mityayeva and others. 21 Sep 61, 2p. (Trans. no. MCL-1101 of Byulleten' Izobreteniy 21:pp. 4, 1960)
Unclassified report

DESCRIPTORS: (*Copper alloys, Zirconium alloys, Rhenium alloys, Anodes, Electrodes, Electronic equipment, Ultra high frequency, Electrical properties, Electrical conductance, Thermal conductivity, Tensile properties, Chemical analysis.) (Technological intelligence, Translations, USSR.)

An alloy intended for use in preparing the anode units and other parts of high-load UHF instruments, and that can be used in the electrotechnical industry for preparing electrodes and contacts which operate at increased temperature contains 0.25 to 0.35% Zr, 0.05 to 0.15% Re, and the rest copper. (Author)

AD-265 701 Div. 17, 26
(TIPTM/GEC) OTS price $2.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
ELECTRIC AND CHEMICO-MECHANICAL METHODS OF WORK-

ING METALS (CHAPTER VII),
by L. Ya. Popilov. 18 Sep 61, 24p. incl. illus. table (Trans. no. MCL-1246 of Elektricheskiye I Khimiko-Mekhanicheskiye Sposoby Obrabotki Metallov 1-424-430, 1958)
Unclassified report

DESCRIPTORS: (*Metals, *Processing.) (Electroplating, Electrodeposition, Electrolytic polishing, Chemical milling, Electroexplosive machinery, Spark machinery, Pickling.) (Heating, Heat treatment, Brazing, Sintering, Soldering.) (Technological intelligence, Translations, USSR.)

Electrochemical methods of electroplating and electrochemical polishing are demonstrated. Chemical milling and metal heating processes are discussed. Heat treating of steel by contact electroheating (N. V. Geveling's method), heating in electrolytes (I. Z. Yasnogodskiy's method), and surface flame hardening are also discussed.

AD-265 774 Div. 17
(TIPTM/BRW) OTS price $1.10

New England Materials Lab., Inc., Medford, Mass.
HARD PARTICLE STRENGTHENING OF REFRACTORY METALS FOR HIGH TEMPERATURE USE THROUGH INTERNAL OXIDATION.
Progress rept. no. 4, 1 July-31 Aug 61,
by A. S. Bufferd, K. M. Zwilsky, and N. J. Grant. 29 Sep 61, 4p. incl. table.
(Contract NOw 61-0316-c)
Unclassified report

DESCRIPTORS: (*Refractory materials, Metals, *Heat resistant alloys, *Molybdenum alloys, Titanium alloys, Oxidation, Hardening, Dispersion hardening.) (Powder metallurgy, Powder metals, Oxides, Titanium compounds, Oxygen, Diffusion, Hydrogen, Heat treatment, Extrusion, Mechanical properties.)

Nine billets of internally oxidized Mo-1.5% Ti alloy were prepared for extrusion. None of these was extruded satisfactorily either in a Dynapac or a conventional high speed press. It is believed that the low density of the billets is responsible for this and several billets are being prepared which will be upset prior to extrusion. (Author)

AD-265 793 Div. 17, 26
(TIPTM/REB) OTS price $1.10

Westinghouse Research Labs., Pittsburgh, Pa.
RESEARCH AND DEVELOPMENT IN HIGH STRENGTH HEAT RESISTANT ALLOYS.
Interim rept. no. 13, 27 June-26 Aug 60,
by L. S. Richardson. 25 Oct 60, 5p. incl. table.
(Contract NOa(s) 58-852-c)
Unclassified report

DESCRIPTORS: (*Heat resistant alloys, *Tantalum alloys, *Tungsten alloys, Mechanical properties, Oxidation, Melting, Electric arcs, Manufacturing methods, Extrusion.)

The manufacture of 5-lb ingots of Ta and W base alloys, is discussed. A Ta-10% W alloy was successfully made by direct-current consumable arc melting. The ingot was then successfully impact extruded to sheet bar. (Author)

AD-265 799 Div. 17, 25
(TIPTP/WH) OTS price $5.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
PHYSICS OF METALS AND METAL WORKING (SELECTED ARTICLES).
28 Sep 61, 51p. (Translation no. FTD-TT-61-3 of Fizika Metallov i Metallovedeniye 11:pp. 186-202, 252-260 and 272-280, 1961)
Unclassified report

DESCRIPTORS: (Translations, USSR.) (*Metallurgy, Metals, Liquid metals, Solids, Solutions.) (*Iron alloys, Electrical properties.) (*Martensite, Friction, Stresses, Elasticity, Crystals.)

Contents:
On the Theory of Behavior of Concentration Heterogeneities in Regular Solid Solutions, by G. L. Krasko and B. Ya. Lyubov; Changes in Electric Resistance and Thermoelectromotive Force in the Process of Alpha-gamma Conversion of Alloyed Iron, by M. Ye. Blanter and A. K. Mashkov; On the Question Pertaining to the Effect of Internal Friction Connected with Direct and Reverse Martensite Conversion, by E. I. Estrin, O. M. Zuyeva, O. P. Maksimova and Yu. P. Piguzov; Growth of Elastic Crystals of Martensite Gamma'-Phase Under the Influence of External Stresses, by I. A. Arbuzova, G. V. Kurdyumov and L. G. Khandros.

AD-265 808 Div. 17, 14, 4
(TIPTM/BRW) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE REACTION OF CERTAIN OXIDES AND CARBIDES WITH REFRACTORY METALS AT HIGH TEMPERATURES,
by G. V. Samsonov, G. A. Yasinskaya, and E. A. Shiller. 6 Oct 61, 7p. incl. illus. tables. (Trans. no. FTD-TT-61-74 of Ogneupory 7:335-338, 1961)
Unclassified report

DESCRIPTORS: (High temperature research, Chemical reactions, *Oxides of Beryllium compounds, Magnesium compounds, Dioxides of Zirconium compounds, *Carbides of Zirconium compounds, Hafnium compounds, Niobium compounds, Tantalum compounds with *Refractory materials, Metals, Niobium, Molybdenum, Tungsten.) (Technological intelligence, Translations, USSR.)

Results are presented of an investigation of the contact reaction of BeO, MgO, ZrO2, and metal carbides (Zr, Hf, Nb, and Ta) with Nb, Mo, and W at temperatures up to 2100 C. Oxides of chemically pure Be and Mg and ZrO2 stabilized with CaO, ZrC, HfC, NbC, and TaC of stoichiometric composition, and also industrially pure refractory metals were used. An oxide or carbide was pressed, after heating for 3 to 5 min on a hot forging press, onto a refractory metal sample. The products obtained were kept in a vacuum furnace with a graphite heater at temperatures from 1000 to 1600 to 2100 C for 0.5 to 5 hr. After extraction the ends were ground, polished, and examined metallographically. Tungsten had the greatest stability with BeO, Mo and W with Mgo, and Mo with stabilized ZrO2.

AD-265 817 Div. 17, 15
(TIPSP/MFA) OTS price $2.60

Towne School of Civil and Mechanical Engineering, U. of Pennsylvania, Philadelphia.
ON SOME VARIATIONAL PRINCIPLES IN ELASTICITY AND

THEIR APPLICATION TO THE THEORY OF TWO PHASE MATERIALS,
by Z. Hashin and S. Shtrikman. July 61, 27p. incl. illus. 14 refs. (Technical rept. no. 1)
(Contract Nonr-55142)
Unclassified report

DESCRIPTORS: (*Elasticity in Linear systems and Theory of Stresses, Shear stresses, Deformation in Tungsten compounds, Carbides, Cobalt alloys.) (Combinatorial analysis, Complex variables, Integrals, Integration, Operators (Mathematics), Fourier analysis.)

The establishment of some variational principles in the linear theory of elasticity and with their application to the determination of the effective moduli of two phase elastic materials is presented. The latter problem in particular and the problem of the determination of effective physical constants of composite materials, in general, received considerable attention. Because of the complexity of the problem, attempts to find effective moduli for such materials were based on simplifying assumptions. A more exact theoretical approach consists of the establishment of bounds on the moduli with the aid of variational principles. (Author)

AD-265 826 Div. 17, 27
(TIPTM/GEC) OTS price $1.60

Aerojet-General Corp., Azusa, Calif.
INVESTIGATION OF STRESS-CORROSION CRACKING OF HIGH-STRENGTH ALLOYS.
Quarterly progress rept. no. 4, 1 July-30 Sep 61, by R. B. Robinson and R. J. Uzdarwin. 20 Oct 61, 4p. tables. (Rept. no. 0414-01-4)
(Contract DA 04-495-ORD-3069)
Unclassified report

DESCRIPTORS: (*Alloys, *Corrosion, *Stresses, Fracture (Mechanics), Corrosion inhibition.) (*Rocket cases, Rocket motors.) (*Steel, *Stainless steel, *Titanium alloys.) (Atmosphere, Temperature, Corrosive liquids, Corrosive gases.) (Welding, Microstructure, Surface properties, Tensile properties, Deformation.)

The accumulation of environmental stress-corrosion test data on the bent-beam and the U-bend test specimens was continued. Bent-beam specimens selected from the high-strength groups of all the alloys except Vascojet 1000 have undergone 51 days of testing in the more aggressive environments without failure. U-bend specimens have undergone 100 days of environmental testing. Based upon the data collected, the Vascojet 1000 alloy steel was the least resistant to stress-corrosion cracking. Preparations are being made for the testing of welded specimens and for testing of all the alloys in a solid-propellant environment. (Author)

AD-265 839 Div. 17, 20
(TIPTM/SEB) OTS price $9.10

Radiation Effects Information Center, Columbus, Ohio.
THE EFFECT OF NUCLEAR RADIATION ON STRUCTURAL METALS,
by Frederic R. Shober. 15 Sep 61, 107p. incl. illus. tables, 606 refs. (REIC rept. no. 20)
(Contract AF 33(616)7375, Proj. 1448)
Unclassified report

DESCRIPTORS: (*Metals, *Alloys, Neutron bombardment, Fast neutrons, Radiation effects, *Radiation damage.) (Iron alloys, Steel, Stainless steel, Zirconium, Zirconium alloys, Nickel, Nickel alloys, Copper, Beryllium, Aluminum alloys, Magnesium alloys, Tantalum, Niobium.) (Mechanical properties, Tensile properties.) Bibliography.

The effect of fast-neutron (>1 Mev) irradiation on the mechanical properties of structural metals and alloys was studied. Although the yield strengths and ultimate tensile strengths are increased substantially for most materials, the ductility suffers severe decreases. This report presents these changes in properties of several structural metals for a number of neutron exposures within the 1.0 x 10 to the 18th power to 5.0 x 10 to the 21st power n/sq cm range. Data summarizing these effects on several classes of materials such as carbon steels, low-alloy steels, stainless steels, Zr-base alloys, Ni-base alloys, Al-base alloys, and Ta are given. Additional data which show the influence of irradiation temperatures and of post-irradiation annealing on the radiation-induced property changes are also given and discussed. Increases as great as 175% in yield strength, 100% in ultimate strength, and decreases of 80% in total elongation are reported for fast-neutron exposures as great as 5 x 10 to the 21st power n/sq cm. (Author)

AD-265 854 Div. 17, 26
(TIPTM/SEB) OTS price $4.60

Vitro Labs., West Orange, N. J.
SUBMICRON SIZED PARTICLES.
Interim technical engineering rept. no. 2, 1 July-30 Sep 61,
by J. D. Holmgren, J. O. Gibson and R. Weidman. Oct 61, 42p. incl. illus. tables.
(Contract AF 33(600)42916)
(ASD TR 7-884, vol. 2)
Unclassified report

DESCRIPTORS: (Particles, Powders, *Powder metals, *Refractory materials, Preparation, Vaporization.) (Metals, Tungsten, Aluminum.) (Carbides of Tantalum compounds, Tungsten compounds.) (Oxides, Dioxides of Silicon compounds, Aluminum compounds, Thorium compounds, Tungsten compounds, Iron compounds, Titanium compounds, Magnesium compounds, Zirconium compounds.) (Electrodes, Electric arcs, Vacuum apparatus.)

Equipment modification and a state-of-the art survey were completed. Significant progress was made toward the development of arc vaporization techniques for a number of refractory materials and, in several cases, extensive characterization and analysis of representative batches are underway. Process development studies have been started on various refractory oxides, metals, and carbides including silica, alumina, thoria, tungsten oxide, iron oxide, titanium oxide, magnesium oxide, zirconium oxide, W metal, Al metal, tantalum carbide and tungsten carbide. Tentative processes have been established for a number of the oxide systems and oxide products in the 130-600 angstroms particle size range have been prepared. The technique has been extended to the metal and carbide systems to prepare samples of highly pyrophoric products ranging down to 42 angstroms in particle size. (Author)

AD-265 886 Div. 17
(TIPTM/BRW) OTS price $.75

National Aeronautics and Space Administration, Washington, D. C.
EFFECT OF DECARBURIZATION ON NOTCH SENSITIVITY

AND FATIGUE-CRACK-PROPAGATION RATES IN 12 MoV STAINLESS-STEEL SHEET,
by William H. Herrnstein, III and Arthur J. McEvily, Jr. Nov 61, 24p. incl. illus. tables. (NASA Technical note no. D-966)
Unclassified report

Also available from NASA, Wash. 25, D. C., as NASA Technical note no. D-966.

DESCRIPTORS: (*Sheets, *Stainless steel, Heat treatment, Controlled atmospheres, Air, Hydrogen, Surface properties, Fatigue (Mechanics), Fracture (Mechanics), Tensile properties, Microstructure.) (Airframes, Rocket cases, Design.) (Carbon, Cleaning.)

Surface decarburization reduced the room-temperature notch sensitivity of the material and also reduced the ultimate tensile strength from 251 ksi to 210 ksi. The residual static strength of decarburized specimens containing fatigue cracks was considerably greater than that of normal specimens tested under the same conditions. Decarburization had no significant influence on the rate of fatigue-crack propagation at the stress levels considered. (Author)

AD-265 965 Div. 17
(TIPTM/TCG) OTS price $1.10

Armour Research Foundation, Chicago, Ill.
FIBER-REINFORCED METALS AND ALLOYS.
Bimonthly rept. no. 3, 19 Aug-18 Oct 61,
by T. J. Koppenaal and N. M. Parikh. 26 Oct 61, 7p. incl. illus. tables (Rept. no. ARF 2221-3)
(Contract NOw 61-0555-c)
Unclassified report

DESCRIPTORS: (*Metals, *Alloys with *Graphite, Fibers, Ceramic fibers, Reinforcing materials, Metallic textiles, Porosity, Tensile properties, Determination, Heat treatment, Microstructure.) (Aluminum, Copper alloys and Aluminum alloys or Nickel alloys.) Production.

Composites containing 5 micron-diam graphite fibers were made with Al, Al-4% Cu, and 50 Co-50 Ni alloy matrices. Al matrix composites made by heating above the mp of Al produced similar yield strengths and ultimate yield strengths less than that of pure Al. The graphite fibers were segregated in layers throughout the specimen. Composites made by sintering the Cu-Ni matrix gave low tensile strengths for the as-composited specimens, but the hot forged and rolled specimens showed higher values. Porosity resulting from sintering reduced the strength, although hot working reduced the porosity.

AD-265 972 Div. 17, 14
(TIPTM/TCG) OTS price $1.60

Armour Research Foundation, Chicago, Ill.
HIGH-TEMPERATURE OXIDATION PROTECTIVE COATINGS FOR VANADIUM-BASE ALLOYS.
Bimonthly rept. no. 2, 12 Aug-11 Oct 61,
by F. C. Holtz. 6 Nov 61, 13p. incl. illus.
(Rept. no. ARF 2227-2)
(Contract NOw 61-0806-c)
Unclassified report

DESCRIPTORS: (*Vanadium alloys, *Metal coatings for Temperature, Oxidation inhibitors, Effectiveness.) (*Coatings, Liquids, Vanadium compounds, Oxides or Sintering of Chromium alloys and Gold alloys.) (Nickel alloys and Magnesium alloys or Chromium alloys, Yttrium compounds, Oxides.) (Bonding, Cements of Silicon coatings, Chromium plating, Titanium alloys or Iron alloys, Chromium alloys, Aluminum alloys.) (Flame spraying of Ceramic coatings, Barium compounds, Titanates.)

Several types of coatings were studied for the protection of V-base alloys in air at 2000 F or above. A specimen of V-1 wt-% Ti-60 $BaTiO_3$ Nb siliconized by pack-cementation, withstood exposure to 2000 F air for 500 hr without evidence of failure or hardening of the alloy base. At 2200 F, a similar coating failed at a corner in 16.5 hr, although the remainder of the coating afforded good protection. Small quantities of Y_2O_3 produced a substantial increase in the mp of V_2O_5, and the oxide mixture offered short-time protection to the V alloy base at 2000 F. Roll-cladding of 70Fe-25Cr-5Al sheet to V-5 wt-% Ti-20 wt-% Nb at 2000 F produced a strong bond. Liquid-phase sintered Cr-Au, a fused Ni-Cr base alloy, and flame-sprayed $BaTiO_3$ gave protection for 0.5 to 1 hr at 2000 F. (Author)

AD-266 004 Div. 17
(TIPTM/BRW) OTS price $.50

Defense Metals Information Center, Columbus, Ohio.
REVIEW OF RECENT DEVELOPMENTS IN THE TECHNOLOGY OF NICKEL-BASE AND COBALT-BASE ALLOYS,
by D. A. Roberts. 31 Oct 61, 2p. (DMIC Memo. no. 135)
Unclassified report

DESCRIPTORS: (Heat resistant alloys, *Nickel alloys, *Cobalt alloys, Dispersion hardening by Oxides, Powder alloys, Oxidation.) (Sheets, Rolling mills.) (Turbojet engines, Rotor blades, Fracture (Mechanics), Thermal stresses.)

Recent developments are summarized in the field of Ni-base and Co-base alloys and high-strength superalloys. Work of interest includes the dispersion hardening of Ni-base materials and a new approach to the development of high-temperature Ni-base alloy sheet. Also included is previous work on the cracking of jet engine buckets which has recently been declassified. (Author)

AD-266 005 Div. 17
(TIPTM/BRW) OTS price $1.25

Defense Metals Information Center, Columbus, Ohio.
STRESS-CORROSION CRACKING OF HIGH-STRENGTH STAINLESS STEELS IN ATMOSPHERIC ENVIRONMENTS,
by C. J. Slunder. 15 Sep 61, 38p. incl. illus. tables (DMIC rept. no. 158)
(Contract AF 33(616)7747)
Unclassified report

DESCRIPTORS: (*Stainless steel, *Austenite, *Martensite, Fracture (Mechanics), Stresses, Corrosion.) (Corrosion research, Corrosive gases, Atmosphere, Corrosive liquids, Test methods, Test equipment.) Mechanical properties, Tensile properties, Chemical analysis, Heat treatment, Deformation, Airframes, Dispersion hardening.

Available information on the stress-corrosion cracking of the high-strength stainless steels was assembled and tabulated according to alloy type and to the environments to which they were exposed. The stainless steels include the cold-rolled austenitics (USS 12 MoV) the martensitic

grades (17-4PH and stainless W) the martensitic precipitation-hardenable grades (17-7PH, PH 15-7 Mo, AM 350 and 355) and the semiaustenitic precipitation hardenable grades (AISI 301, 201, and 202, USS Tenelon, and USS 17-5). Exposures were in the marine atmosphere at Kure Beach, outdoors at several semiindustrial locations, and in several laboratory test environments. Data on the chemical analyses, heat treatments, and mechanical properties of the test materials are included. (Author)

AD-266 025 Div. 17
(TIPTM/EJH) OTS price $8.60

General Telephone and Electronics Labs., Inc., Bayside, N. Y.
GRAIN BOUNDARY CRACKING IN METALS UNDER STRESS AT ELEVATED TEMPERATURES.
Final rept.,
by Jack Brett. 15 June 61, 90p. incl. illus. tables, 12 refs. (Rept. no. TR 61-103.1)
(Contract Nonr-261300)
Unclassified report

DESCRIPTORS: (*Copper, *Brass, *Nickel, *Nickel alloys, *Copper alloys, *Titanium, *Zirconium, Powder metals, Powder alloys, Grains (Metallurgy), Impurities, Purification, Fracture (Mechanics), Creep, High temperature research, Heat resistant alloys.) (Chemical impurities, Aluminum compounds, Nickel compounds, Titanium compounds, Oxides, Zirconium.) Processing, Sintering, Heat treatment, Mechanical properties, Microstructure.

A study was made of the effect of purification and of a number of metal and oxide additions upon the occurrence of intergranular cracking in brass, Cu, Ni, Ti and Zr under tension at elevated temperatures. Purification by a variety of means inhibited intergranular cracking in brass, Cu, and Ni. Zr additions also decreased the frequency of grain boundary cracks in brass and Cu, while Al_2O_3 additions increased the number of cracks. Under a wide variety of conditions, Ti and Zr of commercial purity were immune to grain boundary cracks and intergranular fracture. A few experiments were performed to demonstrate the parallel effect of impurities and additions upon the nucleation of voids during diffusion; the initiation of grain boundary cracks during creep; the mechanism of crack nucleation by vacancy condensation is discussed. (Author)

AD-266 043 Div. 17
(TIPTM/BRW) OTS price $1.60

Westinghouse Electric Corp., Pittsburgh, Pa.
STRESS CORROSION CRACKING.
Final rept.,
by D. van Rooyen and S. Barnartt. 31 Oct 61, 11p. (Research rept. no. 925-7900-R1)
(Contract Nonr-286800, Proj. NR 036-044)
Unclassified report

DESCRIPTORS: (*Corrosion research, *Alloys, *Fracture (Mechanics), Stresses, Corrosion, Propagation, Electrochemistry, Measurement.) *Stainless steel, Nickel alloys, Chromium alloys, Iron alloys, Aluminum alloys, Copper alloys, Magnesium alloys, Additivies, Impurities, Corrosive liquids, Electrolytic cells, Magnesium compounds, Chlorides.)

Experimental work was undertaken to study the qualitative nature of crack propagation in various alloys. The methods used to detect instantaneous mechanical contributions to cracking included detailed measurement of electrochemical potential changes and of extension in length of wire specimens during cracking, as well as recording the sound, if any, generated during cracking. The data led to the conclusion that crack propagation in austenitic stainless steel and in a Mg-base alloy is a gradual process without any indication of steps of sudden fracture. Mild steel in nitrate solutions was found to crack in an uneven manner, and exhibited alternating periods of slow and rapid propagation. The rapid stages, however, did not attain the speed of a brittle fracture. Al-Mg and Al-Cu alloys exhibited crack propagation in alternating steps of electrochemical corrosion and instantaneous physical fracture. The slow advance of cracks in stainless steel, mild steel and the Mg-base alloy is consistent with an electrochemical mechanism. (Author)

AD-266 080 Div. 17, 26
(TIPTM/GEC) OTS price $2.60

New England Materials Lab., Inc., Medford, Mass.
EVALUATION OF ULTRAFINE METAL POWDERS FOR DISPERSION HARDENING PURPOSES.
Final rept. 1 Mar-31 Aug 61,
by R. C. Nelson, K. M. Zwilsky, and N. J. Grant. 31 Aug 61, 15p. incl. illus. tables.
(Contract NOw 61-0672-f)
Unclassified report

DESCRIPTORS: (*Nickel alloys, *Dispersion hardening, Nickel compounds, Aluminum compounds, Oxides, Refractory materials, Powder metallurgy.) (Preparation, Hydrostatic pressure, Sintering, Extrusion.) (Tests, Tensile properties, Stresses, Microstructures, X-ray diffraction analysis, Heat treatment, Crystallization.)

Three Ni - Al_2O_3 alloys were fabricated using ultrafine Ni powder as the base material. One of the alloys containing 10 vol - % gamma Al_2O_3 exhibited better mechanical properties at room temperature and 1500 F than the best Ni - Al_2O_3 alloys fabricated from coarser Ni powder, while the 1800 F values were lower. (Author)

18. MILITARY SCIENCES AND OPERATIONS

AD-265 631 Div. 18, 15
(TIPTB/CCH) OTS price $6.60

Caywood-Schiller, Associates, Chicago, Ill.
A WAR GAME FOR THE EVALUATION OF FIELD ARMY AIR DEFENSE,
by R. A. Sebastian, R. G. Kahr, and D. H. Schiller. 22 May 61, 63p. incl. illus. tables, 10 refs.
(Contract DA 11-022-509-ORD-2850, Proj. TX-1)
Unclassified report

DESCRIPTORS: (*Games theory of Programming, *Antiaircraft defense systems, Computers.) Experimental data.

AD-265 697 Div. 18, 20
(TIPTB/CW) OTS price $2.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
INSTRUMENTS AND EXPERIMENTAL TECHNIQUES (SELECTED ARTICLES).
18 Sep 61, 22p. incl. illus. table, 16 refs.
(Trans. no. MCL-1232 of Pribory I Tekhnika Eksperimenta 1:pp. 55-57, 120-121, 130-132, 1961)
Unclassified report

DESCRIPTORS: (*Ionization chambers, Design, Boron compounds, Fluorides, Electrodes, Coatings.) (*Electromagnets, *Molecular beams, Sources, Capacitors.) (*Neutrons, Recording devices.) *USSR.

Contents:
Gamma-compensated boron trifluoride chambers, by A. B. Dmitriev and M. G. Vorob'yev
Molecular generator operating with a ND3 molecular beam, by N. G. Basov and V. S. Zuyev
Recording device for neutrons from toroidal pulse discharges, by V. V. Matveyev and A. D. Sokolov

AD-265 709 Div. 18, 12
(TIPTB/CW) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
THE FIRST SPACE SHIP,
by V. Bazykin. 3 Oct 61, 5p. (Trans. no. MCL-1293 of Kryl'ya Rodiny 6 pp. 9, 1960)
Unclassified report

DESCRIPTORS: (*Spaceships, USSR, Spaceship cabins.) Translations, Technological intelligence.

19. NAVIGATION

AD-265 689 Div. 19, 6
(TIPTN/CRJ) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
A PHOTOELECTRIC INSTALLATION FOR DIRECTING AND GUIDING OPTICAL INSTRUMENTS AT A TARGET,
by A. I. Demushkin. 3 Oct 61, 3p. incl. illus.
(Trans. no. MCL-1199 of Byulleten' Izobreteniy 9:pp. 41, 1960)
Unclassified report

DESCRIPTORS: (*Photoelectric target seekers, *Optical target designators, USSR, Design.) (Modulators, Transducers, Amplifiers, Phase detectors.)

A photoelectric installation is described for directing and guiding optical instruments at a target, consisting of a modulator, a photoelectronic transducer, an electric frequency amplifier, a phase-frequency detector, electrical indicators, and a guiding device. This device differs from known photoelectric devices in that, in order to increase the accuracy of direction at a target and guiding to the target, and to eliminate the effect of extraneous light, the modulator of this installation is made in the form of 2 mutually perpendicular opaque oscillating cross hairs located in the focal plane of the optical instrument. (Author)

AD-265 807 Div. 19, 2
(TIPTW/RD) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
BEHAVIOUR OF UNPERTURBABLE SYSTEMS IN INERTIAL SPACE,
by V. A. Bodner and V. P. Seleznev. 17 Oct 61, 7p. incl. illus. (Trans. no. FTD-TT-61-63 of Doklady Akademii Nauk SSSR 138:1043-1046, 1961)
Unclassified report

Presented by the Academician V. S. Kulebakin on January 1, 1961.

DESCRIPTORS: (Technological intelligence, USSR, Translations.) (Navigation, *Inertial navigation, Accelerometers, Gyroscopes, Satellites.) (Gravity, Motion, *Celestial mechanics, Orbital flight paths.) (Perturbation theory, Linear systems, Differential equations.)

20. NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

AD-265 523 Div. 20
(TIPTB/JAB) OTS price $6.60

Radiation Effects Information Center, Columbus, Ohio.
RADIATION DOSIMETRY: AN ANNOTATED BIBLIOGRAPHY,
by Mary Jane Oestmann. 15 Sep 61, 62p. (REIC memo. no. 23)
(Contract AF 33(616)7375; continuation of Contract AF 33(616)6564, Proj. 1448)
Unclassified report

DESCRIPTORS: (*Dosimeters, *Bibliography.) (Ionization chambers, Radiation counters, Scintillation counters, Alpha counters.) (Alpha particles, Beta particles, Gamma rays, Measurement, Detection.)

AD-265 524 Div. 20
(TIPTB/JAB) OTS price $1.60

Radiation Effects Information Center, Columbus, Ohio.
MONTHLY ACCESSION LIST 51.
Rept. for 1 - 30 Sep 61.
15 Oct 61, 17p. (REIC Accession list no. 51)
(Contract AF 33(616)7375; Continuation of contract AF 33(616)6564, Proj. 1448)
Unclassified report

DESCRIPTORS: (*Radiation effects on Materials, Polymers, Ceramic materials, Metals.) (*Nuclear propulsion, Space flight, Bibliography, Radiation hazards.) *Dosimeters.

Division 20-NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

AD-265 526 Div. 20, 15
(TIPTP/MFA) OTS price $3.60

Cruft Lab., Harvard U., Cambridge, Mass.
PERTURBATION THEORY OF PION-PION INTERACTION. I. RENORMALIZATION,
by Tai Tsun Wu. 30 Aug 61, 36p. incl. illus.
(Technical rept. no. 346)
(Contract Nonr-186632, Proj. NR 371-016)
Unclassified report

DESCRIPTORS: (*Perturbation theory of *Pions, Particles, Scattering, Couplings.) (Functions, Combinatorial analysis, Integrals, Operators (Mathematics), Transformations (Mathematics).)

The problem of the pion-pion scattering is studied on the basis of the model of a four-particle direct interaction without derivative coupling. Renormalization is carried out for this model with a detailed analysis of overlap insertions. To every finite order in the renormalized coupling constant, it is shown that the unitarity relation holds and that the Feynman integral representation is still valid, and hence renormalization has no effect on analytic properties. (Author)

AD-265 580 Div. 20
(TIPTP/WH) OTS price $3.60

Army Engineer Reactors Group, Fort Belvoir, Va.
REPAIR OF DAMAGED SM-1 CONTROL ROD END CAPS.
Rept. for 25 July-1 Sep 60,
by Thomas J. Hoffmann. 11 Oct 60, 28p. incl. illus. tables (Rept. no. OSB-6)
Unclassified report

DESCRIPTORS: (*Nuclear power plants, Reactor control, *Control rods, Fuel rods, Maintenance.)

During rearrangement of the fuel elements in the SM-1 core, four control rod end caps were damaged because of improper removal procedures. Further unavoidable damage to the end caps occurred in subsequent removal operations. Because of the long lead time necessary to obtain new caps and also because of the large cost involved, it was decided to repair the damaged parts at Ft. Belvoir, Virginia. A water shield tank and remote handling tools were fabricated, the control caps were disassembled, damaged parts were replaced with locally fabricated substitutes, and the reassembled units were put back into service. All work was successfully accomplished without subjecting personnel to dangerous radiation. (Author)

AD-265 581 Div. 20
(TIPTE/CRJ) OTS price $1.60

Army Engineer Reactors Group, Fort Belvoir, Va.
SHIELD TANK CLEAN UP AND COMMERCIAL FILTER HANDLING AT THE SM-1,
Rept. for 1 May-1 Nov 60,
by R. E. Baack. 1 Nov 60, 14p. incl. illus.
(Rept. no. OSB-13)
Unclassified report

DESCRIPTORS: (Reactor hazards, Radioactive waste, Handling, Disposal.) (*Nuclear power plants, Shielding.) (*Radioactive waste disposal, Radiation hazards.) Reactor shutdown, Reactor shielding materials.

The process employed in the purification of the shield tank water, the handling of the commercial filters used during the clean up operation, the assistance obtained from the Chemical Corps for disposal of the radioactive filters, and the main problems of the filtering system are presented. A summary of possible alternate procedures is included. It was concluded that: (a) The system as used was an expedient temporary method of clean up; (b) The handling of the filter using nerve gas cylinders and Conex containers is a tedious operation. The radiation readings on the Conex containers were above the ICC regulations; (c) The replacement of the Conex container with a concrete cask which will meet ICC regulations is not practical due to the concreter cask's size, weight, and cost; (d) Design of an insert for placing filters in the lead demineralizer cask is complete; and (e) Use of demineralizer in place of the filters was acceptable for the one time used. (Author)

AD-265 582 Div. 20
(TIPTM/BRW) OTS price $2.60

Alco Products, Inc., Schenectady, N. Y.
INSPECTION OF SM-1 CONTROL ROD SEAL COMPONENTS. Final rept. on Investigation of SM-1 Control Rod Seal Failure,
by R. A. Chittum, R. M. Saccocio and others.
16 June 61, 16p. incl. illus. tables (AP Note no. 362)
(Contract DA 44-192-eng-17)
(Rept. no. OSB 15, rev. 1) Unclassified report

DESCRIPTORS: (Nuclear power plants, Research reactors, Liquid cooled, *Control rods, Neutron absorbers, Drive shafts, Seals, *Metal seals, Failure (Mechanics) of Chromium plating on Stainless steel, Shafts, Corrosion, Microscopy, Scale, Chemical analysis, Radiographical analysis.) (Seals, Coolants, Water, Pressure, Tests.)

A laboratory test was completed to check leakage rates of a control rod drive seal assembly (shaft, seal rings and diaphragms) which had been in operation in the SM-1 since its original startup. The testing was performed at simulated reactor operating pressure (1200 psi) and room temperature to determine the leakage rate with the seal correctly assembled and with it assembled as it had been during reactor operation i.e., the first diaphragm and seal ring turned around on the seal shaft. No measurable wear was found when the components were measured. Micrographical examination of the Cr plate on a seal shaft removed from the SM-1 showed considerable pitting, corrosion and erosion under and adjacent to some of the stellite ring areas. The most likely cause of removal of the Cr plate was the poor quality plating and inadequate preplate cleaning which resulted in non-metallic inclusions in the material. (Author)

AD-265 583 Div. 20
(TIPTP/WH) OTS price $2.60

Army Engineer Reactors Group, Fort Belvoir, Va.
REMOVAL OF DAMAGED SM-1 CONTROL ROD BASKET,
by John C. Bouldin. 15 Sep 61, 9p. illus.
(Rept. no. OSB-16)
Unclassified report

DESCRIPTORS: (*Nuclear power plants, Reactor control, *Control rods, Fuel rods, Maintenance.)

During rearrangement of the elements in the SM-1 core, (AD-265 580), a control rod basket was damaged so severely that it had to be replaced. The damaged basket assembly was left in the inner shield tank while a safe and practical method of removal could be devised. Several possible solutions to the problem were considered. The method finally selected involved cutting the basket underwater by means of a remote cutter and removing the separate pieces through the fuel transfer chute. This method proved to be effective and the damaged basket was successfully removed without undue difficulty. The basket sections were loaded into a spent fuel cask and shipped to ORNL on 8 May 1961. (Author)

AD-265 584 Div. 20
(TIPTM/BRW) OTS price $2.60

Army Engineer Reactors Group, Fort Belvoir, Va.
INSPECTION OF EUROPIUM - BEARING ABSORBER RODS FOR REACTIVITY CONTROL IN CORE II OF SM-1,
by Thomas J. Hoffmann. 23 Aug 61, 22p. incl. illus. tables (Rept. no. OSB-18)
Unclassified report

DESCRIPTORS: (Nuclear power plants, Research reactors, Reactor cores, *Reactor inspection, *Control rods, Neutron absorbers, Europium, Oxides, Stainless steel.)

During reloading of the SM-1 core, inspection of the Eu_2O_3 dispersion - stainless steel control rod elements was performed. Outside box dimensions and plate thicknesses, were mechanically measured for all the europium absorber elements in the inner shield tank and the results were companed to data taken at ORNL before the elements were exposed to radiation. The results of this comparison showed that no noticeable swelling had occurred. All work was successfully accomplished without subjecting personnel to excessive radiation. (Author)

AD-265 585 Div. 20, 29
(TIPTB/CCH) OTS price $5.60

Army Engineer Research and Development Labs., Fort Belvoir, Va.
REMOVAL OF NUCLEAR BOMB DEBRIS, STRONTIUM 90-YTTRIUM 90, AND CESIUM 137-BARIUM 137 FROM WATER WITH CORPS OF ENGINEERS MOBILE WATER-TREATED EQUIPMENT,
by Maurice Pressman, Don C. Lindsten, and Richard P. Schmitt. 23 May 61, 52p. incl. illus. tables. (Research rept. no. 1673-RR)
(Proj. no. 8-75-07-460)
Unclassified report

DESCRIPTORS: (*Radioactive waste disposal, Decontamination of *Water, Radioactivity, *Decontamination kits, Trailers, Military equipment.) Purification, Electrodialysis, Ion exchange.

A field study on the removal of radioactive substances from water was conducted by the Sanitary Sciences Branch, U. S. Army Engineer Research and Development Laboratories, in cooperation with the Office of Civil and Defense Mobilization, at the Atomic Energy Commission's Nevada Test Site during 16 September through 5 November 1959. Three water-treating units were evaluated for radioactivity-removal efficiency: The standard Army Mobile Water Purification Unit (1,500 gph); a prototype Mobile Ion Exchange Unit (1,500 gph); and an electrodialysis demineralization unit (30 gph). The contaminants used were: (1) aged nuclear bomb debris from an underground detonation, powdered to 3 microns average particle size; (2) strontium 90-yttrium 90; and (3) cesium 137-barium 137. Well water of approximately 900 ppm total dissolved solids was deliberately contaminated with the radioactive material of choice and then subjected to the decontamination procedures. (Author)

AD-265 596 Div. 20, 15
(TIPTP/MFA) OTS price $1.25

National Aeronautics and Space Administration, Washington, D. C.
MONTE CARLO STUDIES OF GAMMA-RAY AND NEUTRON TRANSPORT IN INFINITE HOMOGENEOUS MEDIA,
by Theodore E. Fessler and Millard L. Wohl. Nov 61, 50p. incl. illus. (NASA Technical note D-850)
Unclassified report

Also available from NASA, Wash. 25, D. C. as NASA Technical note D-850.

DESCRIPTORS: (*Numerical methods and procedures, Gamma rays, Neutrons, *Gamma neutron reactions, Neutron cross sections, *Transport properties, Elastic scattering.) (Coding, Probability, Statistical functions, Sampling, Integrals, Real variables, Polynomials.)

Two point-source, infinite-medium Monte Carlo codes were written for the IBM 704 computer. The codes simulate respectively gamma-ray and neutron transport from a monoenergetic source. A detailed description, including importance sampling methods, is given. Results showed good agreement with moments-method calculations for the same geometry. Calculations for 6-Mev gamma rays in tin provide data on the contribution of annihilation radiation to both the buildup factors and energy spectra. Calculations for 1-Mev gamma rays in water are also presented. The results of calculations for 6-Mev source neutrons in water show a peak in the energy spectrum which is found to be due to single scattering of source particles from oxygen. (Author)

AD-265 602 Div. 20
(TIPTP/MFA) OTS price $1.60

Carnegie Inst. of Tech., Pittsburgh, Pa.
NUCLEAR COLLECTIVE MOTION AND THE SHELL MODEL,
by Raymond A. Sorensen. 1961, 17p. incl. illus. (Technical rept. no. 7)
(Contract Nonr-76015, Proj. NR 012-202)
Unclassified report

Talk given at the Gatlinburg Conference on Electromagnetic Lifetimes and Properties of Nuclear States, October 5-7, 1961.

DESCRIPTORS: Nuclear structure, *Nuclear energy, Nuclear shell models, Particles, Neutrons, Protons, Quantum mechanics, *Superconductivity, Theory, Quadrupole moments, Vibrations, Excitation.

The collective effects in connection with certain systematic deviations of nuclear properties from the single particle estimate, in particular the giant quadrupole moments, are of a more subtle type than those considered by N. Bohr and Wheeler, and are intimately connected with the

independent particle aspects of nuclear structure. In the past few years, these collective effects, as for example, those associated with the giant dipole state, can be incorporated into the shell model itself in terms of an interaction between pairs of shell model particles. The advantage of such a treatment is that it makes it possible to compute, in some detail, quantitative consequences of the interplay between the collective and single particle aspects of nuclear structure. (Author)

AD-265 642 Div. 20
(TIPTP/MFA) OTS price $1.60

Florida U., Gainesville.
THE NUCLEAR PROPERTIES OF RHENIUM.
Quarterly technical progress rept. no. 7, 8 Jan-8 Sep 61,
by R. A. Karam. 8 Sep 61, 15p. incl. illus.
(Contract NOa(s) 60-6021-c)
Unclassified report

DESCRIPTORS: (*Nuclear physics, Gamma neutron reactions, Gamma rays, Neutrons, Gamma emission, Elastic scattering, *Rhenium, Neutron spectrum, Cobalt, Gamma ray spectra, Neutron cross sections.) (Instrumentation, Light water reactor, Research reactor, Neutron detectors.) Experimental data.

Experiments designed to separate gamma-ray pulses from neutron pulses in NaI(Tl) were carried out. A 5 mc Co-60 source was used along with the beam of neutrons and gamma rays from the University of Florida Training Reactor to test the method of separation. The pulse-height distributions obtained from the Co-60 source in the beam were treated in the separation as if the Co-60 radiations were part of the gamma rays in the reactor. Another set of experiments were performed without the Co-60 source. (Author)

AD-265 647 Div. 20
(TIPTP/MFA) OTS price $1.60

Florida U., Gainesville.
GAMMA RAY SCATTERING.
Quarterly technical progress rept. no. 9, 18 Dec 60-18 Mar 61,
by John A. Wethington, Jr., R. A. Karam, and C. A. Bisselle. 18 Mar 61, 9p. illus.
(Contract NOa(s) 59-6013-c)
Unclassified report

DESCRIPTORS: (*Elastic scattering, *Gamma emission, Measurement, Photon bombardment.) (Laboratory equipment, Collimators, Crystal counters.) (Sodium compounds, Iodides, Crystals.) (Numerical analysis, Statistical processes, Probability, Series.)

Equipment for final measurements on gamma ray scattering was completed. Mathematical models for pulse-height to photon spectra conversions were established. (Author)

AD-265 648 Div. 20
(TIPTP/MFA) OTS price $1.60

Florida U., Gainesville.
THE NUCLEAR PROPERTIES OF RHENIUM.
Quarterly technical progress rept. no. 6, 8 March-8 June 61,
by John A. Wethington, Jr. and R. A. Karam.
8 June 61, 13p. incl. illus. table.
(Contract NOa(s) 60-6021-c)
Unclassified report

DESCRIPTORS: (*Nuclear physics of *Rhenium, Elastic scattering, Gamma emission and Gamma-neutron reactions in Sheets, Fission neutrons.) (Research reactors, Neutron detector, Pulse analyzer.) Experimental data.

Slabs of rhenium, iron, and carbon were used as targets for slightly degraded fission neutrons from the UFTR. The gamma rays resulting from neutron interactions within any slab were analyzed with a scintillation spectrometer. Methods by which one can measure the elastic and inelastic scattering cross sections for fission neutrons, as well as determination of the gamma-ray yield resulting from inelastic scattering, are discussed. A method for separating the gamma-ray response in a NaI(Tl) crystal from the neutron response in the same crystal is devised on theoretical grounds. Preliminary experimental results indicate such separation is possible. (Author)

AD-265 661 Div. 20
(TIPTB/MS) OTS price $6.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
SOVIET COSMIC RAY STATIONS (Sovetskiya Stantsii Kosmicheskikh Luchei),
by Yu. M. Kopylov. 18 Sep 61, 60p. incl. illus. tables (Trans. no. MCL-981 of Mekhdunarodnyy Geofizicheskiy God 1957-1959, Annee Geophysique Internationale: 32p.)
Unclassified report

DESCRIPTORS: (*Cosmic ray laboratories, *Cosmic rays, Recording systems, Instrumentation, Measurement, USSR.) Air intelligence, Technological intelligence, *Translations.

AD-265 707 Div. 20
(TIPTP/MFA) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
ESTIMATION OF THE EFFECTIVE SCATTERING CROSS SECTIONS OF ELECTRONS BY ALKALI ELEMENTS TAKING INTO ACCOUNT THE STRONG COUPLING,
by R. Damburg and V. Kravchenko. 6 Oct 61, 5p. incl. illus. (Trans. no. MCL-1291 of Izvestiya Akademii Nauk - Latviyskoy SSR 1:73-76, 1960)
Unclassified report

DESCRIPTORS: (*Elastic scattering, *Differential cross section of Electrons, Alkali metals, Nuclear reactions, Electromagnetic waves, Excitation, Oscillation, Wave transmission, Equations.) (Translations, USSR.)

Seaton (Proc. Phys. Soc. 68-A:457, 1957) showed that when calculating the excitation of optically allowed transitions with large forces of the oscillators it is necessary to take into account the strong coupling, because the use of the weak coupling method (for example Born's method) yields for these transitions overestimated values of the excitation cross sections, at times exceeding the theoretical limits. The system of equations is presented for the wave functions of Fo and F1 describing elastic and inelastic scattering in an approximation of two states. (Author)

AD-265 757 Div. 20
(TIPTB/CCH) OTS price $2.60

Hoecker, Frank E., Lawrence, Kans.
HIGH LEVEL RADIATION POLYMERIZATION DOSIMETRY,
Rept. no. 2 (Final) 16 June 60-16 June 61,
by Frank E. Hoecker. 16 June 61, 12p. illus. table.
(Contract DA 19-129-qm-1644, Proj. 7-84-01-002)
Unclassified report

DESCRIPTORS: (X-rays, Gamma rays, Electron beams, Measurement.) (Experimental data, Chemical properties.) (*Radiation effects, *Polymerization of Liquids, Polymers.) *Dosimeter.

Investigation was made of chemical dosimetry which have been proposed and tested. The test equipment is unique in having its own self-contained mechanism for indicating the amount of product resulting from exposure to radiation. This system has been designated as radiation polymerization (Radipol) dosimetry because it utilizes the products of radiation induced polymerization. Its unique feature is a change of state from liquid to solid which serves as a sharp, irreversible end-point to indicate, without the use of auxiliary equipment, the delivery of any predetermined dose of x-rays, gamma-rays or electron beam energy. The basic constituent of this dosimetric system is a liquid monomer which is susceptible to non-linear addition polymerization to form an infinite network of polymer molecules. This may be brought about by an added initiator, by heat, light or high energy ionizing radiation. (Author)

AD-265 759 Div. 20
(TIPTW/CRJ) OTS price $1.60

Hughes Research Labs., Malibu, Calif.
RESEARCH INVESTIGATION OF P-I-N ELECTRON JUNCTION DETECTORS.
Interim engineering rept. no. 1, 1 July-30 Sep 61.
Oct 61, 9p. incl. illus.
(NObsr-85511)
Unclassified report

DESCRIPTORS: (Radiation counters, *Beta counters, *Gamma counters, Sensitivity, Tests.) (Beta particles, Gamma rays, Measurement.) Detectors.

The counting performance of p-i-n solid-state detectors for beta and gamma radiation was partially established. Tests with several uncalibrated isotopes and with a calibrated Co(60) source indicated good response to both beta and gamma radiation at several energy levels for a wide range of count rates. The detector obeys the inverse square law and has an efficiency of about 3.6% when counting photons from Co(60). (Author)

AD-265 779 Div. 20
(TIPTP/MFA) OTS price $1.60

Naval Radiological Defense Lab., San Francisco, Calif.
EARLY TIME DECAY OF FISSION PRODUCT MIXTURES IV GAMMA IONIZATION CHAMBER MEASUREMENTS FOLLOWING THERMAL NEUTRON FISSION OF Pu 239,
by P. O. Strom, D. Sam and others. 15 Sep 61, 21p. incl. illus. tables, 34 refs. (Rept. no. NRDL-TR-528)
Unclassified report

DESCRIPTORS: (*Gamma rays, *Ionization chambers, Measurement following *Thermal neutrons, *Fission of *Plutonium, Radioactive isotopes, Isotopic cross section.) (Radiochemistry, Analysis, Radioactive decay, Gamma emission.) (Test reactors, Nuclear reactions, Experimental data, Tables.)

Gamma ionization chamber readings are given for the products of thermal neutron fission of Pu-239 for the period from 1 second to about 22 hours following fission. Using spectral data on U-235 fission products and ionization chamber efficieny with gamma energy, the energy release rate of Pu-239 fission products is determined as a function of time. The results are compared with those attained for U-235 fission products. (Author)

AD-265 787 Div. 20
(TIPTW/DLW) OTS price $4.60

Naval Radiological Defense Lab., San Francisco, Calif.
RADIATION INSTRUMENTATION FOR THE CLASSIFICATION OF NUCLEAR EXPLOSIONS AT SEA,
by E. J. Wesley. 7 Sep 61, 53p. incl. illus. tables, 19 refs. (Rept. no. NRDL-TR-525)
Unclassified report

DESCRIPTORS: (*Underwater explosions, *Nuclear explosions, Radioactivity, Underwater, Identification, Detection, Analysis, *Radiation instruments, Instrumentation, Measurement.) (Sea water, Radioactivation analysis, Monitors, Test equipment.)

A survey was made of the measurement problems, environment and instrumentation requirements for the detection and sampling of clandestine nuclear explosion debris at sea. The survey was oriented toward the problems of a search team policing a world nuclear test ban and recommends improvement of existing water probing devices and development of a ship-to-water survey system and expendable depth probes. The depth probes would explode a charge on contact with submerged radioactive pools and this signal would be monitored by the ship's sonar. (Author)

AD-265 821 Div. 20
(TIPTP/TL) OTS price $1.60

Washington U., St. Louis, Mo.
THEORETICAL AND EXPERIMENTAL STUDIES IN NUCLEAR PHYSICS.
Final rept. June 61; Quarterly status rept. no. 17, Feb-Apr 61,
by E. U. Condon, E. Feenberg, and others. Oct 61, 11p. (Technical rept. no. 48)
(Contract AF 18(603)108, Proj. 37504)
Unclassified report

DESCRIPTORS: (*Nuclear physics, Theory, Test.) (*Cosmic rays, *Beta particles, *Gamma rays, Phonons.) (Magnetic susceptibility, Superconductivity, Photographic emulsion.) (Elastic scattering, Nuclear fluorescent scattering, Wave transmission, Polarization, Beta decay, Polariscopes.) (Chlorine, Beryllium, Boron.)

Contents:
Theoretical studies in nuclear matter
Phonon-Phonon interaction in liquid helium
Correlation functions
High energy potential scattering

Nuclear reaction studies
  Polarization in deutron-alpha scattering
  Elastic scattering of deutrons from boron and beryllium
  Proton polarization measurement with the helium-polarimeter
  Proton polarization using a carbon polarimeter
  Cyclotron modification
Cosmic ray studies with photographic emulsions
Beta and Gamma ray studies
  Longitudinal polarization of Ne-19 positions
  Mossbauer examination of superconductivity transistions
  Beta decay of chlorine-40
  Orientation of beryllium-7
  KL(1) transition in high Z elements

AD-265 903 Div. 20, 25, 30
(TIPTP/WH) OTS price $13.00

Martin Co., Baltimore, Md.
ANPP NUCLEATE BOILING PROGRAM. LABORATORY SIMULATION OF PM-1 CORE THERMAL AND HYDRUALIC TRANSIENT CONDITIONS.
Final rept.,
by J. J. Jicha, R. Lightner and others. Oct 61, 188p. incl. illus. tables (Rept. no. MND-E-2418)
(Contract DA 44-192-eng-6)
Unclassified report

DESCRIPTORS: (Nuclear power plant, Pressurized water reactors, *Nucleate boiling.) (Reactor fuels, Control rods, Reactor feasibility studies, Reactor cores, Reactor power density, Thermal utilization, Instrumentation, Power coefficient of reactivity, Reactor control, Critical assemblies.) (Thermocouples, Calibration, Tables.) *Simulation.

A system was developed for the simulation of reactor power excursions due to unchecked control rod withdrawal and for loss of pumping power incidents as experienced by a fuel element and its flow channels. The PM-1 pressurized water reactor plant was used. It was shown that the system could simulate power excursions having varying rates of rise and peak power. The system could also be programmed to give various rates of flow decay accompanied by power decays caused by rod scram or reactor void and temperature coefficients. Experiments were performed with a test section which was designed to simulate the thermal and hydraulic characteristics of a selected PM-1 reactor fuel element. The element selected for simulation was that considered most susceptible to burnout. An analog study was performed to specify behavior during credible PM-1 incidents of unchecked control rod withdrawal and loss of pumping power. (Author)

AD-265 927 Div. 20
(TIPTW/DLW) OTS price $10.50

Bendix Corp., Cincinnati, Ohio.
200-MILLIROENTGEN RADIACMETER RESEARCH.
Final rept. 15 Feb-1 Sep 60,
by C. R. Siebentritt, Jr., R. A. Sardeson and others. 1 Sep 60, 140p. incl. illus. tables.
(Rept. no. R-60-CDE-01-03)
(Contract NObsr-72754, Proj. NE-051500)
Unclassified report

DESCRIPTORS: (*Dosimeters, *Radiation counters, *Gamma counters, Gamma rays, X rays, Radiation instruments, Radiation hazards, Measurement, Monitors, Design.) (Military personnel, *Naval personnel, Safety devices, Reliability.) (Dosimeters, Optical systems, Light transmission, Reticles, Processing, Manufacturing methods, Tests.)

Detailed instructions are given for manufacturing, processing, and testing the Bendix-developed 200-mr personnel dosimeter. Individual components were redesigned for maximum compatibility, with the reliability of the final product as the ultimate goal. Many of the problems encountered during the construction phase of the project are reviewed along with their solutions. A mathematical analysis of light transmission through the dosimeter is included as an aid for further study and development of the present optical system. A detailed processing procedure is carefully delineated to insure that the meter can be mass produced. The processes used in the construction of this meter are the most advanced state of the art and were tried and proven in practice. (Author)

AD-265 982 Div. 20
(TIPTP/MFA) OTS price $2.60

California U., Berkeley.
QUASI-ELASTIC NUCLEON-NUCLEUS SCATTERING AT HIGH ENERGY,
by Robert Karplus and Yoshio Yamaguchi. Aug 61, 25p. incl. illus. tables.
(Contract AF 49(638)327)
(AFOSR-1614) Unclassified report

DESCRIPTORS: (*Elastic scattering, *Nucleons, Energy, Motion, Differential cross section, Targets.) (Functions, Trigonometry, Equations.)

The angular distribution for elastic nucleon-nucleon scattering at the high energy is sharply peaked in the forward direction. As a consequence, there is an angular interval in nucleon-nucleus scattering to which successive small-angle elastic nucleon-bound nucleon scatterings are more likely to contribute than a single nucleon-bound nucleon scattering through the angle of observation. Such plural collisions result in outgoing nucleons which have suffered a smaller energy loss than nucleons that are scattered from hydrogen at the same angle. The Fermi motion of the bound-nucleons produces a broadening in the energy distribution of the scattered nucleons, but displaces the centre of the distribution only negligibly. The results of calculations with a simple model are in satisfactory agreement with the observations on proton-carbon scattering. (Author)

AD-265 989 Div. 20, 25
(TIPTP/WH) OTS price $1.60

Connecticut U., Storrs.
ON THE RELATIONSHIP BETWEEN THE SCATTERING CROSS SECTION IN THE CENTER OF MASS SYSTEM, AND THAT IN THE LABORATORY SYSTEM, FOR ARBITRARY INITIAL CONDITIONS.
Final technical rept.,
by Lester Lipsky and Arnold Russek. Sep 61, 18p. incl. illus.
(Contract DA 19-059-ORD-2702, Proj. TB2-001 (2188))
(AROD rept. no. 2188:2)
Unclassified report

DESCRIPTORS: (*Nuclei, Nuclear shell models, Nuclear reactions, *Differential cross sec-

tions, *Elastic scattering.) (Targets, Nuclei Particles, Motion, Velocity.) (Mathematical analysis, Determinants, Transformations (Mathematics).)

The transformation from center of mass to laboratory system of two colliding bodies is discussed in detail, including a derivation of the Jacobian. The scattering cross section in the laboratory system is then defined for all lab. angles. Then, a formal integral can be written which averages over a distribution of target velocities, giving an effective cross section as a function of the distribution (which in turn is usually a function of temperature). No actual calculations are carried out because of the exceedingly complex formulas which have to be manipulated. (Author)

AD-266 020 Div. 20
(TIPTP/MFA) OTS price $6.60

General Dynamics/Fort Worth, Tex.
A METHOD FOR CALCULATING TEMPERATURES IN WATER-COOLED NUCLEAR REACTORS,
by J. B. McGuffin. 30 Sep 61, 61p. incl. illus. tables (Rept. no. FZK-9-168; NARF-61-35T)
(Contract AF 33(600)38946)
Unclassified report

DESCRIPTORS: (Temperature in *Light water reactors, Heat transfer, Cooling, Reaction kinetics, Reactor fuels.) (Laboratory equipment, *Heat exchangers, Design.) (Statistical analysis, Equations, Fourier analysis.) (Experimental data, Tables.)

Reliable methods are presented for calculating bulk-system temperatures and maximum fuel-element surface temperatures in water-cooled nuclear reactors where no phase changes of the coolant are permitted. Cumbersome heat-transfer coefficients, which are generally expressed in dimensionless moduli, have been converted into the product of a temperature-dependent parameter (base-factor) and an engineering parameter (K-factor) based on the physical dimensions of the system. The resulting equation is integrated directly into the equation for calculating fuel-element surface temperatures. Graphs are presented which permit a rapid determination of the effect of changes in wet-bulb temperatures, flow rates, or heat loads on the system temperatures. From the graphs, many different types of heat-transfer problems can be solved directly instead of by long laborious alternative methods. Derivations of the pertinent equations are given in the appendices. (Author)

AD-266 050 Div. 20, 25, 30
(TIPTP/WH) OTS price $8.10

Martin Co., Baltimore, Md.
ANPP NUCLEATE BOILING PROGRAM.
Quarterly progress rept. no. 4, Mar-May 61. June 61, 83p. incl. illus. tables (Rept. no. MND-E-2417)
(Contract DA-44-192-eng-6)
Unclassified report

DESCRIPTORS: (*Pressurized water reactors, *Nucleate boiling, Simulation, Data processing systems, Digital computers, Coding, *Programming.) (*Reactor cores, Fuel burn up, Reactor safety systems, Fuel elements, Critical assemblies, Reactor reactivity.)

Progress achieved in Nucleate Boiling Program is summarized. A digital data reduction code, DARK, was prepared to work a test problem. The design of a detailed experimental program was completed; a total of 62 test runs, including steady-state reference tests, is planned. Tests were performed to determine the transient response of bulk coolant and surface thermocouples. A complete test section was installed in the loop and instrumented. All instrument and control installations were completed. Loop modifications and shakedown tests were completed. Operational checks of the voltage regulator for the motor-generator set indicated some circuit design problems. (Author)

AD-266 071 Div. 20
(TIPTP/WH) OTS price $9.60

National Co., Inc., Malden, Mass.
INVESTIGATION OF COUPLED ELECTRON AND NUCLEAR SPIN SYSTEMS,
by Alexander Ganssen and Earl Law Sloan, III. Mar 61, 119p. incl. illus. tables, 37 refs.
(Contract AF 30(602)2008)
(RADC TR 61-132)
Unclassified report

DESCRIPTORS: (Nuclear spins, *Nuclear magnetic moments, *Paramagnetic resonance, Free radicals, Liquids.) (Relaxation time, Ions, Electrons, Cavity resonators.) (Oscillator circuits, Nuclear resonance, Nuclear magnetic resonance.) Microwave spectroscopy.

A theory is presented which describes the time-dependent nuclear magnetization production obtained by means of the Overhauser effect in low-viscosity liquids containing unpaired electrons in free radicals or paramagnetic ions. An experimental technique is described which allows the simultaneous determination of the nuclear magnetization and of the nuclear spin lattice relaxation time T1 on a flowing sample. The liquid flowing in a teflon capillary within a homogeneous magnetic field of about 3300 Gauss passes through a microwave cavity, where a partial saturation of the elctron spin resonance is accomplished with a comparatively strong microwave field. The dynamic polarization resulting from the coupling with the electron spin system is detected by two nuclear magnetic resonance detection coils equipped with separate detection systems, arranged successively outside of the microwave cavity. The accuracy of the determination of the proton spin lattice relaxation time T1 with the liquid-flow technique is discussed under special consideration of the flow velocity distribution given by laminar and turbulent flow. (Author)

AD-266 072 Div. 20, 11, 13
(TIPTB/CW) OTS price $1.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
RADIOLOGICAL DECONTAMINATION SWEEPER.
Final rept.,
by W. R. Nehlsen. 18 Oct 61, 17p. incl. illus. tables (Technical rept. no. 172)
(Proj. Y-F011-05-203)
Unclassified report

DESCRIPTORS: (*Radioactive fall-out, *Pavements, *Decontamination, Vehicles, *Brushes.)

Division 21-NUCLEAR PROPULSION
Division 22-ORDNANCE

Three types of pavement sweepers were investigated to determine their adaptability for high-rate radiological decontamination. A runway sweeper utilizing an air nozzle pickup was found to be not adaptable. Ordinary street sweepers can perform limited services as decontamination sweepers, but are not suitable for complete development as high-rate units. A sweeper developed for Air Force decontamination needs, is adaptable to the task requirements. (Author)

21. NUCLEAR PROPULSION

AD-265 961 Div. 21
(TIPTM/SEB) OTS price $5.60

Aerospace Corp., El Segundo, Calif.
ADVANCED PROPULSION STUDIES. SUMMARY OF RESEARCH IN THE FIELD OF ADVANCED NUCLEAR PROPULSION.
Semiannual technical rept., 1 Nov-30 June 61, by M. L. Rosenzweig. 30 June 61, 60p. incl. illus. 27 refs. (Rept. no. TDR-(1203-01)STR)
(Contract AF 04(647)594)
Unclassified report

DESCRIPTORS: (*Nuclear propulsion, Gases, Vortices, Design, Fluid flow, *Fluid mechanics, Turbulence, Turbulent boundary layer, Turbulent flow, Theory, Mathematical analysis.) (Jet mixing flow, Magnetohydrodynamics.) Laboratory equipment.

A summary is presented of work performed in the field of advanced nuclear propulsion. The research study is concerned with gaseous nuclear propulsion systems, and particularly with the fluid dynamics problems associated with the development of a gaseous vortex reactor. A significant accomplishment in the period covered by this report was the generation of 25 stable vortices in a single container. This device, known as the vortex matrix, is designed to reduce viscous dissipation and turbulence levels below those values inherent in single, jet-driven vortex tubes. A second experiment, designed to evaluate turbulent shear distributions in single, jet-driven vortices, is also described and, in addition, associated analytical studies are discussed. An analytical study concerning magnetohydrodynamic vortex power generation was performed. (Author)

22. ORDNANCE

AD-265 514 Div. 22
(TIPTW/JRG) OTS price $15.50

Armour Research Foundation, Chicago, Ill.
LONG RANGE STUDY PROGRAM LIGHTWEIGHT ARTILLERY WEAPON.
Final rept.,
by R. M. Brach. Apr 61, 237p. incl. illus. tables.
(Contract DA 11-022-ORD-2543, Proj. TW-201)
Unclassified report

DESCRIPTORS: (*Rocket launchers, Artillery rockets, Automatic, Mobile, *Design, Feasibility studies, Tests.) (Rocket launchers, Mobile, Air transportation by Helicopters.) (Artillery units, Armament.) (Rocket launchers, Motion, Tests, Mathematical analysis, Mathematical computer data, Programming.)

This study concerned the development of a lightweight artillery weapon launcher which can be transported by helicopter. The prototype no. 3 Launcher, XM70E1, 115mm was instrumented with strain, pressure and displacement gages; these furnished the actual loading and motion of the launcher structure. In addition to certain simple dynamic analyses, a 3-degree-of-freedom, nonlinear mathematical model of the launcher dynamics was derived and programmed for solution on Armour Research Foundation's Univac 1105. The output of the computer program was correlated with experiment and used to study the effect of physical parameter variations. Regions of instability of the launcher motions were shown to exist for burst firings; relationships between component stiffness and damping were found which optimized the launcher response to firing loads, based upon a simple accuracy criterion. Certain design suggestions were evaluated and shown to benefit the accuracy of the launcher. (Author)

AD-265 646 Div. 22, 26
(TIPTM/BRW) OTS price $2.60

Frankford Arsenal, Philadelphia, Pa.
INSPECTION OF THE WELD METAL-BASE METAL INTERFACE OF WELDED COPPER OVERLAY ROTATING BANDS,
by H. J. Addison, Jr. Aug 61, 16p. illus. tables. (Test rept. no. T62-2-1)
(Proj. 9530-0020)
Unclassified report

DESCRIPTORS: (Projectiles, Steel, *Rotating bands, Copper, Bonding, *Arc welds, Welded joints, Porosity, Quality control, Military requirements, Specifications, Tests.) Microstructure.

A study was conducted to determine if the test procedure stipulated in Specification MIL-R-13562A is adequate for detecting voids at the overlay-base metal interface of welded copper rotating bands. The results of a metallographic study indicated that interfacial voids in excess of the specification requirement were detected by the test procedures stipulated by the specification. Based on the results of this study, therefore, the specified test method is adequate. During the study, microscopic examination revealed the presence of an intermittent layer at the interface of all overlays that were examined. Some characteristics of the layer are discussed. (Author)

AD-265 865 Div. 22, 30
(TIPTW/CDM) OTS price $6.60

Iowa State U., Iowa City.
AN EVALUATION OF INSTRUMENTATION FOR MEASURING THE BEHAVIOR OF A ROCKET LAUNCHER IN LABORATORY TESTS AND DURING A FIRING.
Rept. no. 4 on Data Acquisition and Reduction, Part 1, Phase 2,

by J. Denkmann, J. Hurt, and R. Beckett. July 61, 56p. incl. illus.
(Contract DA 11-070-508-ORD-1232, Proj. 517-01-002)

Unclassified report

DESCRIPTORS: (Rocket launchers, Accelerometers, *Instrumentation, Gyroscopes.) (*Rocket launchers, Beams, Load distribution, Vibration, Motion, Measurement, Numerical methods and procedures, Mathematical analysis.) (Rockets, Guidance.) Data processing systems.

The suitability of various types of devices for measuring the motion of a rocket launcher and rocket launcher components was investigated. The launcher motion was measured to determine the launcher characteristics, and during a firing to learn the behavior of the launcher in service. This information was obtained for defining the motion of the rocket during guidance. Measurements of the launcher motion was done from the point of view of defining the reason for measuring the motion and to present some of the problems that are encountered. The problem of finding the motion of the rocket, if the motion of the beam is known is made in propositions for evaluating the relative motion between the beam and the rocket shoes. Some of the various systems and devices that might be used to measure launcher motion are presented. The relationship is shown between input and output for those systems that seem promising. The results for the gyroscope and accelerometer are discussed. A suggested instrumentation for gathering appropriate data is made. (Author)

AD-265 877 Div. 22
(TIPTW/EET) OTS price $1.60

Miller Research Labs., Baltimore, Md.
PRODUCTION ENGINEERING OF PLASTIC COMPONENTS FOR 81 mm T214E2 ILLUMINATING CARTRIDGE.
Progress rept. no. 3, 1-30 Sep 61,
by E. R. Briggeman. 10 Oct 61, 15p. incl. illus. tables (Rept. no. 251-3)
(Contract DA 36-034-ORD-3468)

Unclassified report

DESCRIPTORS: (*Cartridges, Cartridge cases, *Illuminating projectiles, Tail fuzes, Impact fuzes, Configuration, Design, Manufacturing methods, Production, Costs.) (Cartridge cases, Materials, Cellulose, Phenolic resins, Plastics, Molding, Machining, Production, Costs.)

AD-265 901 Div. 22
(TIPTW/DLW) OTS price $1.10

Measurement Systems, Inc., Norwalk, Conn.
QUANTUM DETECTOR FOR MEASUREMENT OF EED BRIDGE WIRE TEMPERATURE RISE.
Monthly progress rept. no. 4, 1-31 Oct 61.
1 Nov 61, 5p. incl. illus. (Rept. no. ER-7026)
(Contract N178-7934)

Unclassified report

DESCRIPTORS: (*Electric detonators, *Electric igniters, *Electric bridges, Electric wire, Electromagnetic fields, Electromagnetic effects, *Temperature warning systems, Safety devices, Hazards, Design.) (*Detectors, Lead compounds, Sulfides, Infrared detectors, Miniature electronic equipment, Mirrors, Cooling, Cryogenics, Materials, Test equipment.)

Investigations in the following areas were initiated or completed: (1) selection of PbS detector, (2) manufacture of experimental short radius of curvature mirrors, (3) construction of experimental vibrating reed chopper, and (4) further investigations on cooled detectors. (Author)

AD-265 923 Div. 22
(TIPTW/JRG) OTS price $2.60

Naval Ordnance Test Station, China Lake, Calif.
STANDARD LABORATORY PROCEDURES. PART I. STABILITY, SENSITIVITY, PHYSICAL PROPERTIES, AND ANALYSES FOR HIGH EXPLOSIVES,
by O. K. Pennington. Aug 61, 26p. incl. illus. tables (NOTS rept. no. TP 2742)
(NAVWEPS rept. no. 7764, pt. 1)

Unclassified report

DESCRIPTORS: (*Explosives, Stability, Sensitivity, Physical properties, Analysis, Test methods, Tests.) (*RDX, *TNT, Waxes, Analysis.) (Determination, Greases, Aluminum in Powder metals.) (Explosives, Density, Temperature, Stability, Sensitivity, Moisture, Rupture, Melting.)

Descriptions are given for standard laboratory procedures for the investigation of explosives. They cover: (1) the determination of density; (2) percentage of grease in Al powders; (3) composition of Composition B and cyclotol; (4) determination of wax in Composition B; (5) impact sensitivity tests; (6) vacuum thermal stability; (7) compressive strength; (8) melting point; (9) percent moisture; (10) shear strength; and (11) modulus of rupture.

AD-266 014 Div. 22
(TIPTW/JRG) OTS price $2.60

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
ELECTRIC INITIATORS: A REVIEW OF THE STATE OF THE ART.
by Gunther Cohn. Nov 61, 31p. 15 refs. (Rept. no. LM-A2357-12)
(Contract DA 36-034-501-ORD-3115, Proj. nos. 505-01-003 and TN1-2707)

Unclassified report

DESCRIPTORS: *Symposia, *Electric detonators, *Electric primers, Design, Safety, Test equipment, *Radiation hazards, *Electromagnetic fields, Ordnance, Bibliography.

Papers are presented which summarize 2 technical meetings held at The Franklin Institute: (1) the Electric Initiator Symposium (Nov. 1960) which was concerned with research and development of electric initiators in general; and (2) the HERO Congress (May 1961) which dealt with research and development on the hazards of electromagnetic radiation to ordnance. Covering 65 papers, this report serves as a subject index and as a handy desktop reference. A bibliography of 15 basic initiator references is attached.

Division 23-PERSONNEL AND TRAINING
Division 24-PHOTOGRAPHY AND OTHER REPRODUCTION PROCESSES
Division 25-PHYSICS

23. PERSONNEL AND TRAINING

AD-265 824 Div. 23, 28
(TIPTB/CW) OTS price $1.60

Personnel Lab., Aeronautical Systems Div., Lackland Air Force Base, Tex.
FACTORIAL STRUCTURE OF BASIC TRAINING PERFORMANCE VARIABLES,
by Fred E. Holdrege. July 61, 12p. incl. tables. (Proj. 7719)
(ASD TN 61-50) Unclassified report

DESCRIPTORS: (*Aviation personnel, *Aptitude tests, *Personality tests, Classification, *Factor analysis.)

Peer nominations of basic airmen on 25 traits had been previously factor analyzed into six factors, only four of which were interpretable. A new analysis was made with six added variables based on tactical instructor ratings and objective measures of aptitude, education, and age. The new analysis duplicates the first four factors of the previous analysis (General Rating Factor, Agreeableness, Surgency, Motivation for Military Life). By the addition of age and the aptitude measure to the analysis, the remaining two factors of the new analysis can be interpreted as Maturity and Intelligence. (Author)

24. PHOTOGRAPHY AND OTHER REPRODUCTION PROCESSES

No Entries

25. PHYSICS

AD-265 500 Div. 25, 7
(TIPTM/REB) OTS price $1.10

Stanford Research Inst., Menlo Park, Calif.
THERMOELECTRIC MATERIALS.
Bimonthly progress rept. no. 15, 1 Apr-1 June 61, by J. W. Johnson. 13 June 61, 5p. incl. illus. table.
(Contract NObs-77017, Proj. NS-058-001)
Unclassified report

DESCRIPTORS: (*Thermoelectricity, *Intermetallic compounds, Materials, Semiconductors, *Copper compounds, Nickel compounds, Aluminum compounds, Sulfides, Electrical properties, Resistance, Measurement, Test equipment.)

A special, sealed cell was constructed for the determination of the Seebeck coefficient of cuprous sulfide under 1 atm S pressure from 1170 to 1020 C. Cuprous sulfide with excess Cu had much lower thermal electromotive force than either cuprous sulfide or Cu2S under 1 atm pressure of S vapor. Examination of the test cell after cooling to room temperature indicated that the method was not suitable for resistivity measurement. Preliminary experiments were made on the mutual solubility of cuprous chloride-cuprous sulfide system. A solubility of 14 mol-% cuprous sulfide in molten cuprous chloride was found at 400 C.

AD-265 522 Div. 25, 17
(TIPTM/REB) OTS price $1.25

General Electric Co., Schenectady, N. Y.
RESEARCH ON THE BEHAVIOR OF NEARLY PERFECT CRYSTALS.
Rept. for 5 Dec 58-5 Dec 60 on Solid State Research and Properties of Matter,
by P. D. Gorsuch and T. H. Alden. July 61, 43p. incl. illus. tables, 27 refs.
(Contract AF 33(616)6181, Proj. 7021)
(ARL 56) Unclassified report

DESCRIPTORS: (*Metallic crystals, *Single crystals, Mechanical properties, Crystal structure, Growth, Surfaces, Deformation, Corrosive liquids, Reagents, Electron microscopy.) (Iron, Single crystals.) (Reagents, Solutions of Hydrochloric acid, Water, Ethanols, Copper compounds, Chlorides.) (Solutions of Hydrochloric acid, Ethanols, Copper compounds, Chlorides, Nitrophenols.) *Crystals, Lattices, Deformation.

Etching techniques have been developed which are capable of producing etch pits at the intersection of dislocation lines with various crystal surfaces of high-purity single crystals of alpha-iron. For the (100) and (110) surfaces, dislocations can be revealed with or without the segregation of a specific impurity to the dislocation sites. Similar etching reagents can be used to reveal dislocations on the (110), (112) and (491) surfaces as well as all surfaces that make an angle of more than 5 degrees with the (100) and (111) planes. The dislocation structure of selected iron whiskers with (100), (110), and (111) growth axes was evaluated using the above etching techniques. There was some qualitative indication that the perfection of the whiskers increases with decrease in whisker diameter and with increase in purity of the halide salt used in their growth. (Author)

AD-265 536 Div. 25, 15
(TIPTP/MFA) OTS price $3.60

General Electric Co., Syracuse, N. Y.
NON-LINEARIZED THEORY OF TRANSVERSE PLASMA OSCILLATIONS,
by Jacob Enoch. Sep 61, 39p. incl. illus.
(Rept. no. R61SD152)
(Contract AF 30(602)1968)
Unclassified report

DESCRIPTORS: (*Nonlinear systems, Theory, *Plasma physics, *Electromagnetic waves, *Plasma oscillations, Electric fields.) (Distribution theory, Integral transforms, Integration, Differential equations.)

Exact, non-linearized solutions of the Vlasov equation for a homogeneous, neutral plasma with

infinitely heavy ions in the presence of transverse electromagnetic waves are found. The dispersion relation is developed both for stationary waves and for the general initial value problem. For stationary waves the result is analogous to that obtained by Van Kampen in his linearized treatment of the longitudinal plasma oscillations. The initial value problem approach yields results similar to those of Landau but the damping term is probably insignificant in the transverse case. It is proved that no growing wave solutions exist. A distribution function which is consistent with a single wave packet solution of the wave equation, and which propagates subject to an arbitrary root of the dispersion relation, is constructed. The intimate relationship between the initial electron distribution function and the dispersion relations is discussed. (Author)

AD-265 537 Div. 25, 9, 15
(TIPTP/MFA) OTS price $9.10

General Dynamics/Pomona, Calif.
THERMAL STRESSES IN PERFORATED PLATES AND BODIES OF REVOLUTION,
by R. D. Sutherland, S. M. Manville, and others. June 61, 105p. incl. illus. tables. (Rept. no. TM-349-35)
(Contract AF 49(638)592; Continuation of Contract AF 49(638)238)
(AFOSR-1050) Unclassified report

DESCRIPTORS: (*Thermal stresses in *Metal plates and *Bodies of revolution.) (Elasticity, Ogives, Drag.) (Conformal mapping, Functions, Complex variables, Polynomials, Partial differential equations.)

Methods are derived for the determination of thermal stress in perforated plates and bodies of revolution. The perforated plate problem, being two-dimensional, is found to be amenable to the complex analysis of Muskhelishvili. The problem of thermal stresses in bodies of revolution is solved in an exact manner by restricting the problem to the aft end of the ogive-shaped body considered. (Author)

AD-265 557 Div. 25, 8
(TIPTM/EJH) OTS price $3.60

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
MIGRATION AND EFFECTS OF COPPER IN P-TYPE BISMUTH TELLURIDE,
by Oscar P. Manley. 1 Sep 60, 35p. incl. illus. tables, 22 refs. (Technical rept. no. 376)
(Contracts DA 36-039-sc-78108, Proj. 3-99-00-000 and Nonr-184151)
Unclassified report

DESCRIPTORS: (*Copper, Chemical impurities, *Diffusion in Chemical reactions, Semiconductors, *Bismuth compounds, *Tellurides, Resistance, Hall effect, Low temperature research, Thermoelectricity.) (Crystals, *Single crystals, Crystal structure, Lattices, Chemical impurities, Diffusion.) (Thermocouples, Bismuth compounds, Tellurides.) Test methods, Test equipment, X-ray diffraction analysis.

The effects of Cu on p-type Bi2Te3 were studied by examining the changes in resistivity and thermoelectric power induced in samples placed in intimate contact with Cu. The experimental results were used to estimate the over-all change in the electrical transport parameters between the limits of no Cu present and full compensation. Because of analytical difficulties, it was not possible to determine such changes for intermediate degrees of doping. Furthermore, the data for the regions in which the host lattice was overcompensated indicated that a chemical change was taking place. The interpretation of these measurements allowed the activation energy for diffusion of Cu in the direction parallel to the cleavage planes to be measured; the results agreed with those reported by others. (Author)

AD-265 562 Div. 25, 5, 15
(TIPTP/MFA) OTS price $2.60

Antenna Lab., Ohio State U. Research Foundation, Columbus.
A NEW ITERATIVE TECHNIQUE IN THE NONLINEAR THEORY OF MICROWAVE PLASMA CONDUCTIVITY.
Rept. on Ion Sheath Research,
by Ta-Shing Chu. 15 Sep 61, 19p. (Rept. no. 1021-8)
(Contract AF 33(616)6782)
Unclassified report

DESCRIPTORS: (Nonlinear systems, Theory, Microwaves, *Plasma physics, Conductivity, Hypersonics, Satellite vehicles.) (Communication systems, *Electromagnetic waves, Propagation, Electromagnetic fields, Radio signals.) (Harmonic analysis, Statistical functions, Distribution theory, Partial differential equations, Fourier analysis, Integration.)

A new iterative method is outlined for obtaining solutions of the Boltzmann's equation encountered in the nonlinear theory of microwave plasma conductivity. The systematic nature of this technique provides the capacity of handling an arbitrary number of driving terms. The procedures will be first illustrated by the third-harmonic generation and then applied to the mutual interaction of two moderately strong signals at different frequencies. Explicit expressions are given for the various frequency components of the modified electron distribution function. (Author)

AD-265 566 Div. 25, 20
(TIPTP/TL) OTS price $4.60

Stanford U., Calif.
ELECTRON SCATTERING FROM A QUANTIZED LIQUID DROP,
by J. D. Walecka. Aug 61, 41p. incl. table. (Technical note no. 388-48)
(Contract AF 49(638)388)
(AFOSR-1498) Unclassified report

DESCRIPTORS: (Quantum mechanics, *Electrons, *Scattering, Liquids, Drops, Oscillation, Electron transitions, Surface tension.) (Photons, Field emission, Inelastic scattering, Elastic scattering.) Magnetic moments.

The theory of an electron interacting with a quantized liquid drop is examined, the Hamiltonian being consistently written to second order in the parameters describing the distortion. When second order terms are kept, some care is necessary in defining the observable value of the radius. Form factors, calculated in Born approximation, for all of the transitions in the

drop model are given as well as the probabilities for the real photon emission. The correction to Coulomb scattering coming from the exchange of a transverse photon is also calculated. A model is made of the contribution of the nuclear magnetization to the transverse photon exchange. In general, the Coulomb scattering will dominate. Spherically symmetric compressional oscillations of a drop with surface tension are also discussed and the form factors for transitions calculated. (Author)

AD-265 567 Div. 25, 20
TIPTP/JW) OTS price $3.60

Stanford U., Calif.
ELECTROMAGNETIC PROPERTIES OF THE LOW-LYING STATES OF C-12 IN THE OSCILLATING DROP MODEL, by J. D. Walecka. Aug 61, 28p. incl. illus. table, 35 refs. (Technical note no. 388-49)
(Contract AF 49(638)388)
(AFOSR-1499) Unclassified report

DESCRIPTORS: (*Quantum statistics, *Carbon, Electrons, Drops, Quadrupole moments, Electromagnetic properties, Elastic scattering, Inelastic scattering, Surface tension, *Nuclear physics, Hydrogen, Helium.) (Energy, Vibration, Oscillation, Excitation, Deformation, *Atomic energy levels, Electron transition, Parametric resonance, Resonance absorption.) Quantum mechanics, Photons, Astrophysics.

The electromagnetic properties of the first four states of 6C6(12) are discussed within the framework of the incompressible drop model. The radius of the drop is determined by the elastic electron scattering from the ground state. By adjusting the mass and surface tension of the drop to fit the energy and lifetime for Gamma-decay of the first excited state, one obtains agreement with the inelastic scattering cross sections from both the first and second excited states. The third excited state is interpreted as an octupole vibration through the inelastic electron scattering cross section. The total electromagnetic decay width of the second excited state, which is of astrophysical interest, is also calculated. (Author)

AD-265 599 Div. 25, 7, 12
(TIRTM/REB) OTS price $5.00

General Electric Co., Schenectady, N. Y.
THERMOPILE GENERATOR FEASIBILITY STUDY. PART II. MATERIALS INVESTIGATIONS.
Final rept. 1 July 57-31 Mar 60, ed. by J. H. Bredt. Aug 60, 323p. incl. illus. tables.
(Contract AF 33(616)5281, Proj. 3145)
(WADD TR 60-22, pt. 2)
Unclassified report

DESCRIPTORS: (*Power supplies for Spaceships, Satellite vehicles, *Thermopiles, Generators, Materials.) (Refractory materials, Metals, Alloys, Intermetallic compounds, Transition elements, Semiconductors, Electrical properties, Resistance, Thermal conductivity, Thermal radiation, Test equipment, Measurement.) *Thermoelectricity.

Studies of descriptions are presented of thermopile generators as sources of electrical power: (1) metallic materials; (2) power/unit volume; (3) thermoelectric power of alloys and transition metal hydrides; (4) refractory materials for thermoelectric generator elements; (5) Seebeck voltage and resistivity of refractory metals; (6) thermoelectric power of refractory borides, carbides, nitrides, and silicides; (7) results in the study of oxide thermoelectric generator materials; (8) Seebeck voltage and resistivity of compositions based on Cr oxide; (9) oxides for thermoelectric generator applications; (10) measurements of resistivity and Seebeck coefficient of ferrites and titanates ; (11) thermoelectric studies of encapsulated intermetallic and liquid semiconductors; (12) growth of single crystals of transition metal oxides, and their thermal conductivity; (13) thermal conductivity studies with the Powell Method; (14) analysis of radiation heat losses in measurement apparatus; (15) measurements - A meter.

AD-265 605 Div. 25, 9
(TIPTT/MFA) OTS price $4.60

Aerospace Corp., El Segundo, Calif.
ON THE STABILITY OF INTERNALLY PRESSURIZED CONICAL SHELLS UNDER AXIAL COMPRESSION, by Paul Seide and Victor I. Weingarten. Sep 61, 41p. incl. illus. tables (Rept. no. TDR-930(2570-30)TN-1)
(Contract AF 04(647)930: In cooperation with Space Technology Labs., Inc., Los Angeles, Calif.)
Unclassified report

DESCRIPTORS: (*Stability, Pressure, *Conical bodies, Axially symmetric flow, *Compressible flow, Buckling, Load distribution, Structural shells, Stresses, Hydrostatic pressure.) (Experimental data, Transformations (Mathematics), Integral transforms, Tables.)

The results of an investigation to determine the influence of small deflections on the stability of internally pressurized conical shells under axial compression is presented. The critical axial load is found to depend on a geometry parameter for the small end of the cone, the internal pressure, and, unlike results for cylindrical shells, the end fixity of the shell. Experimentally obtained data are in qualitative agreement with theory but differ quantitatively, probably because of yielding of the low melting temperature alloy used to clamp the ends of the shells and yielding of the shell material. (Author)

AD-265 615 Div. 25, 26, 7
(TIPTM/BRW) OTS price $1.60

Alloyd Corp., Cambridge, Mass.
A FUNDAMENTAL STUDY OF ROLLING CONTACT FATIGUE. Quarterly progress rept. no. 1, 1 May-1 Aug 61, by G. S. Reichenbach and E. P. Kingsbury. 1 Aug 61, 11p. incl. illus.
(Contract NOw 61-0656-c)
Unclassified report

DESCRIPTORS: (*Fatigue (Mechanics), Single crystals, Roller bearings, Ball bearings, Lubrication.) (Stresses, *Lithium compounds, Fluorides, Single crystals, *Plastic flow, Lattices, Deformation, Determination, Pickling, Electrolytes, Iron compounds, Chlorides.) (Test equipment, Design.)

An investigation was begun on rolling contact fatigue. The initial plastic flow in single crystals when stressed by a rolling steel ball

will be studied by etch pit techniques. Single crystals of LiF were etched with a 1.5 x 10 to the 4th power molar solution of FeCl3 before and after stressing. Rather indistinct pyramidal pits were observed on old dislocations, and sharp square pyramidal pits on new dislocations which indicate the first areas of plastic flow and where a fatigue crack could start. A test apparatus was designed for rolling balls on the surface of single crystals under carefully controlled conditions to obtain plastic flow at the contact. It is planned to study the influence of lubricants on rolling contact and torsion fatigue.

AD-265 616 Div. 25, 17
(TIPTM/SEB) OTS price $.50

Battelle Memorial Inst., Columbus, Ohio.
STUDIES OF GRAIN-BOUNDARY DIFFUSION BY ELECTRON-PROBE MICROANALYSIS.
Final rept., 1 Mar 59-15 Mar 61 on Solid State Research and Properties of Matter,
by A. E. Austin, N. A. Richard, and C. M. Schwartz. July 61, 11p. incl. illus. tables, 17 refs.
(Contract AF 33(616)6265, Proj. 7021)
(ARL-49) Unclassified report

DESCRIPTORS: (*Metallic crystals, Diffusion of Nickel into *Copper, Crystals, Grains (Metallurgy), Lattices.) (Gold, Nickel, Electroplating.) (Gold, Diffusion into Zinc, Single crystals.) (Theory, Mathematical analysis.)

The diffusion of Ni into grain boundaries of various tilt angles in copper bicrystals was studied. Concentration contours from the grain boundary and the lateral-lattice diffusion were measured by means of electron-probe microanalysis. The products of grain-boundary width and diffusion coefficient were calculated and comparisons were made with theoretical solutions. The grain-boundary coefficient is concentration dependent above 3% Ni in a 45-degree tilt boundary. With lower tilt angles, the coefficient is concentration dependent above 0.5% Ni. (Author)

AD-265 666 Div. 25, 17
(TIPTM/BRW) OTS price $6.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
PECULIARITIES OF THE COMBUSTION OF THE ELECTRIC ARC IN VACUUM ARC FURNACES,
by I. V. Polin. 28 Aug 61, 61p. incl. tables, 16 refs. (Trans. no. MCL-1009 of Metallurgiya, Sbornik Statey 2:188-220, 1959)
Unclassified report

DESCRIPTORS: (Metals, Alloys, Melting, *Vacuum furnaces, Electric arcs, Stability, Plasma oscillations, Temperature, Pressure, Electrodes, Thermionic emission.) (Technological intelligence, Translations, USSR.) (*Electric arcs, Combustion.)

Contents:
Cathode spot
The cathode region of the arc discharge
The positive column of the arc
Length of positive column of arc discharge
Anode area
The anode spot
Effect of magnetic field upon arc discharge
Alternating current arc

AD-265 673 Div. 25, 17
(TIPTM/EJH) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
REACTION OF BORON AND CHROMIUM IN NICKEL-BASE TERNARY ALLOYS,
by P. T. Kolomytsev. 28 Aug 61, 9p. (Trans. no. MCL-1020 of Issledovaniya po Zharoprochnym Splavam, Moskva 6:180-186, 1960)
Unclassified report

DESCRIPTORS: (*Nickel alloys, *Chromium alloys, *Boron alloys, *Heat resistant alloys, *Phase studies, Phase transitions, Lattices, Crystals.) (Nickel compounds, Chromium compounds, Borides.) Chemical reactions, Chemical analysis, Crystal structure, X-ray diffraction analysis, Microstructure, Hardness, USSR, Technological intelligence, Translations.

The paper presents the results of an investigation of the phase composition of alloys of the Ni - Cr - B system, containing up to 25% Cr and small amounts of boron. On the basis of study of the micro- and macrostructure, it may be held that in alloys enriched in B, CrB, having a high melting point, crystallizes long before the onset of solidification of the solid solution and the NB, and the formation of CrB is dependent not only upon the concentration of B and Cr in the alloy, but upon the maximum temperature of the melt. (Author)

AD-265 694 Div. 25, 15
(TIPTP/WH) OTS price $6.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
REPORTS OF THE SOCIETY FOR THE STUDY OF RUSSIAN ENGINEERING.
18 Sep 61, 58p. incl. illus. (Trans. no. MCL-1228 of Mathematics-Mechanics, July 23: 697-705, 1959)
Unclassified report

DESCRIPTORS: (Translations, USSR.) (*Mechanics, Applied mathematics, *Elasticity, Plasticity.) Armor piercing ammunition.

Contents:
Dynamic problems of a block on an elastic semi-plane, by L. M. Fridman
Fundamental drawing of a sliding curve, by S. S. Goluskevich
Irregular motion of a continuous medium, by K. P. Stanyukovich
Similarities between the theory of armor-piercing ammunition and flow theory, by Dr. Lavrent'ev
Problems in the general theory of plasticity, by A. A. Ilyushin
The sixtieth birthday anniversary of Dr. M. A. Lavrent'ev

AD-265 703 Div. 25, 17
(TIPTM/BRW) OTS price $1.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
THE COEFFICIENT OF FRICTION IN THE PLASTIC REGION OF CONTACT,
by B. P. Stoyukhin. 18 Sep 61, 12p. (Trans. no. MCL-1249 of Izvestiya Vysshikh Uchebnykh Zavedeniy - Mashinostroyeniye 1:32-38, 1961)
Unclassified report

DESCRIPTORS: (*Metals, Processing, Deformation, *Friction, Surface properties, Elasticity, Plasticity, Pressure, Forging, Stresses, Mathematical analysis, Equations.) (Technological intelligence, Translations, USSR.)

The dependence of the coefficient of friction on the parameters characterizing the elastic and plastic properties of the material is examined and the magnitude of the forces of cohesion (molecular interaction) is determined for contact surfaces in a plastic state. (Author)

AD-265 706 Div. 25, 9
(TIPTP/MFA) OTS price $1.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
INVESTIGATION OF CONVECTIVE HEAT TRANSFER IN A TUBE WITH A TWISTING FLOW OF CONSTANT PITCH LENGTH,
by V. K. Yermolin. 3 Oct 61, 10p. incl. illus. tables (Trans. no MCL-1290 of Inzhenerno-Fizicheskiy Zhurnal 3:52-57, 1960)
Unclassified report

DESCRIPTORS: (Convection, *Heat transfer, *Hydrodynamics, Turbulent flow, Energy, Pipes, Tanks, Experimental data, Tables.) (Translations, USSR.)

One of the existing methods to intensify convective heat transfer is the hydrodynamic method based on the use of the aerodynamic possibilities of a twisting flow as a method to intensify convective heat transfer is examined which leads to a better utilization of the initial section of the tube, thus bringing about actual conditions for developing heat exchangers for straight short tubes. Analysis is confined to swirling flows with a constant pitch length which are produced by using internal curvilinear inserts with a relative pitch s/d from 0.95 to infinity. (Author)

AD-265 764 Div. 25, 9
(TIPTP/MFA) OTS price $1.60

Hughes Research Labs., Malibu, Calif.
CESIUM PLASMA STUDIES FOR THERMIONIC ENERGY CONVERSION.
Semi-Annual technical summary rept.,
by R. C. Knechtli and J. Y. Wada. Oct 61, 19p. incl. illus.
(Contract Nonr-350100, Proj. NR 09-358)
Unclassified report

DESCRIPTORS: (Plasma physics, *Gas ionization, Cesium, Vapors, *Thermionic emission, Measurement, Electrostatics.) (Instrumentation, Cathodes, Electron tubes, Tungsten, Metal plates, Vacuum apparatus.) Experimental data.

A new method for direct measurement of the recombination coefficient a of cesium plasmas was developed. Further measurements to determine the actual value of a rather than an upper limit are in preparation. The effect of emitter temperature and cesium vapor pressure on the formation of sheaths on a cesium plasma emitter was investigated theoretically and experimentally. The cesium plasma emitter is a hot tungsten or tantalum disk in cesium vapor; ions are produced by contact ionization and electrons by thermionic emission. Good agreement was obtained between theory and experiment, demonstrating that readily controllable electron or ion sheaths could be obtained. Correlation was established between the existence of excess noise in the plasma and the presence of an electron accelerating ion sheath at the plasma emitter. (Author)

AD-265 798 Div. 25
(TIPTP/WH) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
FROM THE CLAY POT TO PLASMA STORAGE,
by G. Pokrovskiy. 18 Oct 61, 7p. incl. illus.
(Trans. no. FTD-TT-61-1 of Tekhnika Molodezhi 1:15-16, 1959)
Unclassified report

DESCRIPTORS: (*Plasma physics, *Magnetic pinch, Magnetohydrodynamics, Particles, Phonons.) (Translations, USSR.)

AD-265 802 Div. 25
(TIPTP/WH) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
INTEGRAL FUNCTIONS OF THE ABSORPTION OF LONG-WAVE RADIATION IN THE ATMOSPHERE,
by V. Ye. Zuyev. 4 Oct 61, 12p. incl. illus.
(Trans. no. FTD-TT-61-39 of Izvestiya Vysshikh Uchebnykn Zavedeniy, Fizika 3:28-34, 1961)
Unclassified report

DESCRIPTORS: (Translations, USSR.) (Water vapor, Carbon dioxide, *Infrared radiation, Absorption, Atmosphere.) (Heat transfer, Atmosphere.) Spectrographic analysis.

On the basis of the analysis of the results of laboratory measurements on the absorption of water vapor and CO2 in individual bands, a method is proposed for the calculation of the integral functions of the absorption of long-wave radiation by water vapor or carbon dioxide in the horizontal layers of the atmosphere. (Author)

AD-265 812 Div. 25, 9
(TIPTP/WH) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE MOTION OF A CONDUCTING GAS IN A MAGNETOGASDYNAMIC GENERATOR,
by O. A. Berezin. 23 Oct 61, 14p. incl. illus.
(Trans. no. FTD-TT-61-104 of Seriya Matematiki, Mekhaniki i Astronomii 13:93-102, 1960)
Unclassified report

DESCRIPTORS: (*Magnetohydrodynamics, Mathematical analysis, Differential equations.) (*Gases, Motion, Gas generating systems, Thermal conductivity, Differential equations.) (Translations, USSR.)

Two-dimensional stationary motion of a nonviscous and thermally nonconductive, conducting gas from a stationary source is examined. The assumption is made that, at sufficiently long times, the diagram of the motion of a conducting gas in a magnetogasdynamic generator differs little from the equilibrated one. All unknown hydrodynamic and magnetic values are independent of time. (Author)

AD-265 828 Div. 25
(TIPTP/WH) OTS price $3.60

Aerospace Corp., El Segundo, Calif.
SOME EFFECTS OF FLUID MOTION ON THE PROPAGATION OF ELECTROMAGNETIC WAVES,
by Melvin Epstein. Sep 61, 29p. incl. illus. tables (Rept. no. TDR-930(2230-04)TN-1)
(Contract AF 04(647)930)
Unclassified report

DESCRIPTORS: (*Fluid mechanics, Propagation, *Electromagnetic waves.) (Propagation, *Electromagnetic waves, *Fluid flow, *Heat transfer, Electrons, Electric fields, Motion, Differential equations.) (Electrical conductance, Gas ionization, Differential equations.)

Physical arguments were given to deduce that when an electromagnetic wave propagates through a flowing gas, the response of a typical electron to the electric field associated with the wave would be different from that which would occur if the gas were stationary. An analysis indicates that this is indeed the case even if the fluid velocities are nonrelativistic. The change in the propagation characteristics of the gas were determined for several limiting cases of collision frequency, plasma frequency, and signal frequency. The effect of nonrelativistic fluid velocities was found to be small unless the plasma frequency is much greater than, and/or the collision frequency is much less than, the signal frequency. It was also found that an additional mode of propagation exists due to the fluid velocity. This mode propagates essentially with the fluid velocity and is very highly damped unless the collision frequency is very small. The third mode damps to 1/e times its original value in a distance which is of the order of the ratio of the convective velocity to the collision frequency. (Author)

AD-265 829 Div. 25, 30, 20
(TIPTP/JW) OTS price $2.60

Aerospace Corp., El Segundo, Calif.
SOME THETA PINCH EXPERIMENTS,
by Mitchell H. Dazey and Stanley L. Leonard. 18 Aug 61, 25p. incl. illus. tables. (Rept. no. TDR-594(1208-01)TR-4)
(Contract AF 04(647)594)
Unclassified report

DESCRIPTORS: (*Plasma physics, *Magnetic pinch, Plasma oscillation, Deuterium, Ionization.) (Plasma physics, *Thermonuclear experiments, Instrumentation, Magnetic fields.)

The theta pinch was studied in an apparatus which generates a 10,000-gauss magnetic field parallel to the axis of a cylindrical pinch tube. The field rises to full value in about 1.5 micro seconds and remains virtually constant for 7 micro seconds. The compression of a strongly pre-ionized deuterium plasma by the applied field and the subsequent radial oscillations of the plasma column were observed by means of magnetic probes, streak photography, and Kerr cell photography. Outward radial streaming of the plasma is observed in a configuration suggesting the flute instability. Axial streaming of the plasma out the ends of the drive strap is also detected. The radial oscillation frequency and the time of arrival of the incoming plasma surface at a prescribed radius are compared with predicted values based on phenomenological theories. (Author)

AD-265 842 Div. 25
(TIPTM/EJH) OTS price $3.60

Brown U. Div. of Applied Mathematics, Providence, R. I.
FURTHER STUDY OF THERMAL STRESSES IN VISCOELASTIC MATERIALS WITH TEMPERATURE-DEPENDENT PROPERTIES,
by Eli Sternberg and M. E. Gurtin. Oct 61, 34p. 15 refs. (Technical rept. no. 2)
(Contracts Nonr-56230 and Nonr-56225)
Unclassified report

DESCRIPTORS: (*Solids, *Spheres, *Elastic shells, Materials, Elasticity, Viscosity, Stresses, Temperature, Mechanical properties, Theory.) Solid state physics, Mathematical analysis, Differential equations, Integral equations.

The implications of thermo-rheologically simple behavior in the context of the quasi-static linear theory of viscoelastic solids are discussed. Included are: (1) a resume of the appropriate governing field equations, boundary conditions, and initial conditions for 3-dimensional problems; (2) discussion of the analogous 2-dimensional theory and the connection between the plane-strain and the generalized plane-stress solutions associated with one and the same plane problem; (3) generalizations of certain theorems of ordinary thermoelasticity theory, including results concerning temperature fields that fail to cause thermal stresses; and (4) the particular problem of a spherical shell of arbitrary thickness. (Author)

AD-265 846 Div. 25, 13, 9
(TIPTP/TL) OTS price $2.60

Institute of Air Flight Structures, Columbia U., New York.
VIBRATIONS OF INFINITELY LONG CYLINDRICAL SHELLS UNDER INITIAL STRESS,
by A. E. Armenakas and G. Herrmann. Oct 61, 29p. incl. illus. table (Technical note no. 6; CU-17-61)
(Contract AF 49(638)430, Proj. 9782)
(AFOSR-1150) Unclassified report

DESCRIPTORS: (*Cylindrical bodies, *Elastic shells, Vibrations, *Stresses, Motion, Density, *Deformation, Thickness, Pressure, Surfaces, Hydrostatic pressure, Theory.) (Algebra, Equations.) (Stresses, Mathematical analysis.)

The bending theory of shells under the influence of initial stress is applied in this investigation to study the effect of initial uniform circumferential stress, uniform bending moment and uniform radial shear on the dynamic response of an infinitely long (motion is independent of the axial coordinate) elastic circular cylindrical shell. (Author)

AD-265 896 Div. 25,
(TIPTP/TL) OTS price $3.60

Michigan U., Ann Arbor.
DYNAMIC RESPONSE OF THE 6-FOOT DIAMETER SHOCK TUBE TO A CONSTANT VELOCITY PRESSURE FRONT,
by Sing-Chih Tang. Aug 1, 34p. incl. illus.
(Rept. no. 03704-1-F)
(Contract AF 29(601)2793)
(AFSWC TR 61-60) Unclassified report

DESCRIPTORS: (*Shock tubes, *Elastic shells, *Load distribution.) (Dynamics, Stresses,

Velocity, Pressure, Shock waves, *Beams, Damping, Vibration, Elasticity, Time, Deflection, Deformation, Volume.) (Differential equations, *Partial differential equations, Numerical analysis, Numerical methods and procedures.) (Stresses, Mathematical analysis.)

The problem of determining the dynamic effect of an internal nondecaying pressure front which moves with constant velocity parallel to the axis of a circular tube is treated. It was known that the equations for the problem of a beam resting on an elastic foundation are equivalent to those for a circular tube, after a simple replacement of constant terms. Thereafter, the equivalent beam problem is considered with both infinite and finite lengths. The finite beam is investigated with two types of boundary conditions: both ends simply supported, and both ends fixed. Viscous damping is considered for the infinite beam. The effects of shear and rotatory inertia are neglected in all cases. It is shown that the dynamic factors for the infinite and finite beams are nearly identical, and the solution for one circular tube is obtained on the basis of an equivalent infinite beam. (Author)

AD-265 925 Div. 25, 2
(TIPTP/MPA) OTS price $2.60

Naval Research Lab., Washington, D. C.
THE TRANSMISSION OF LIGHT SIGNALS BEYOND THE HORIZON,
by J. A. Curcio, G. L. Knestrick and others.
2 Oct 61, 24p. incl. illus. tables, 14 refs.
(NRL rept. no. 5676)
Unclassified report

DESCRIPTORS: (*Light transmission, *Signals, Scattering in *Atmosphere, *Twilight, Sky brightness, Aerosols, Particles, Infrared radiation, Nuclear explosions.) (Instrumentation, Experimental data, Equations, Tables.)

A preliminary investigation of the transmission of light signals beyond the horizon is presented. For certain assumed, clear-atmosphere parameters, calculations were made of the signal available from a projected source. The signal strength is given as a function of wavelength and of distance when receiver and projector are at zero elevation. For most atmospheric conditions, the infrared is the best wavelength region from the standpoint of maximum flux transmission over large distances. The available flux is drastically attenuated as the distance is increased, although discernible flux at distances of several hundred kilometers appears to be obtainable. A few experimental data show reasonable agreement with the computed predictions of signal strength as a function of wavelength and range based on the Junge-type atmospheric model. (Author)

AD-265 926 Div. 25, 6
(TIPTW/DLW) OTS price $5.60

Electronic Materials Research Lab., U. of Texas, Austin.
USE OF THE PHOTODIELECTRIC RESPONSE OF SEMICONDUCTORS TO DETECT INFRARED AND VISIBLE RADIATION.
Thesis,
by William H. Hartwig. May 61, 51p. incl. illus. tables, 41 refs. (Rept. no. 110)
(Contract AF 19(604)5717)
(AFCRL-819) Unclassified report

DESCRIPTORS: (*Semiconductors, *Infrared detectors, Detectors, Infrared radiation, Light, Detection, Refractometers, Perturbation theory, Theory, Feasibility studies.) (*Cavity resonators, Dielectrics, Semiconductors, Dielectric properties, Photoconductivity, Physical properties, Sensitivity, Photosensitivity, Frequency shift, Electric fields.) (Dielectric properties, Semiconductors, Measurement, Instrumentation.) Infrared photoconductors, Materials, Theses.

The feasibility of using the photodielectric response of semiconductors to detect infrared and visible radiation is shown to depend upon purity, temperature, and the frequency when the photodielectric behavior of the material is acting to change the field configuration in a resonant cavity. The frequency dependence of a reentrant coaxial cavity upon the physical properties of a terminating disc is derived using the perturbation equation. Semiconductors possess both dielectric and conductive properties which depend, in part, upon the density of free carriers. An equation relating the dielectric constant of semiconductors to the physical properties is derived. Photodielectric effects are treated theoretically to determine the minimum radiant spectral flux density required to generate an electron-hole pair density equal to the thermal carrier density. The results of the research show no improvement over photovoltaic detection with materials presently available. (Author)

AD-265 949 Div. 25, 17, 7
(TIPTM/EJH) OTS price $2.60

Chrysler Corp., Detroit, Mich.
RESEARCH PROGRAM ON SEMICONDUCTING COMPOUNDS FOR THERMOELECTRIC POWER GENERATION AT HIGH TEMPERATURES.
Bi-monthly progress rept. no. 6, 15 Mar-14 May 61,
by C. R. Lewis. 14 May 61, 19p. incl. illus. table.
(Contract NObs-78664)
Unclassified report

DESCRIPTORS: (*Semiconductors, *Intermetallic compounds, Refractory materials, *Thermoelectricity, High temperature research, Electrical properties, Resistance, Thermal conductivity, *Electric power production.) Power supplies, Hafnium compounds, Tantalum compounds, Tungsten compounds, Rhenium compounds, Arsenides, Antimonides, Bismuth compounds, Selenides, Tellurides.

This program covers the investigation of semiconducting combinations of the heavy refractory metals with high atomic weight elements of groups IV B, V B, and VI B of the periodic table, and of less metallic variations of the refractory superlattice intermetallic compounds, as possible materials for high temperature thermoelectric elements. (Author)

AD-265 950 Div. 25, 17, 7
(TIPTM/EJH) OTS price $2.60

Chrysler Corp., Detroit, Mich.
RESEARCH PROGRAM ON SEMICONDUCTING COMPOUNDS FOR THERMOELECTRIC POWER GENERATION AT HIGH TEMPERATURES.
Final rept.,
by C. R. Lewis. Aug 61, 23p. incl. illus. table.
(Contract NObs-78664)
Unclassified report

DESCRIPTORS: (*Semiconductors, *Intermetallic compounds, Refractory materials, *Thermoelectricity, High temperature research, Electrical properties, Resistance, Thermal conductivity, *Electric power production.) Power supplies, Hafnium compounds, Tantalum compounds, Tungsten compounds, Rhenium compounds, Germanium compounds, Arsenides, Antimonides, Bismuth compounds, Selenides, Tellurides, Test equipment.

The program resulted in the preparation and preliminary determination of some electrical and thermal properties of 17 intermetallic compounds, at least 6 of which have never previously been prepared. The main emphasis was the rapid survey of possible intermetallic compounds of a number of refractory metals with amphoteric semi-metals, and their behavior as possible semiconductors. As a group, these compounds exhibited behavior ranging from metallic to semi-conducting and tended to decompose in a vacuum at only moderate temperatures. No promising high temperature thermoelectric materials were discovered, although an analysis under certain plausible assumptions indicates that a figure of merit of approximately 0.6 x 10 to the -3rd power could be obtained with more refined methods of preparation. Other compounds exhibited semi-conducting properties which may be of interest for applications other than thermoelectric generation. (Author)

AD-265 973 Div. 25, 13
(TIPTP/WH) OTS price $3.60

Brown U., Providence, R. I.
BUCKLING OF AN ELASTIC-PLASTIC CYLINDER SUBJECTED TO EXTERNAL PRESSURE AND HEATING,
by A. Gjelsvik and S. R. Bodner. Oct 61, 1v. incl. illus. tables (Technical rept. no. 25)
(Contract Nonr-56220, Proj. NR-064-424)
Unclassified report

DESCRIPTORS: (*Cylindrical bodies, *Deformation, Buckling, Pressure, Heat, Thermal stresses.) (Structures, *Stresses, Elasticity, Plasticity.) (Mechanics, Stresses, Mathematical analysis, *Load distribution.)

The elastic plastic stress distribution is obtained for a long, thick walled cylinder subjected to radially symmetric external pressure and heating. The stress distribution is also calculated using the approximations of thin walled shell theory, but it is found that this solution could, in certain cases, lead to serious discrepancies even for thin walled shells. The buckling load of the partially plastic cylinder is computed by an energy method using the buckling theory of thin walled shells. It is shown that partial yielding due to the combination of pressure and temperature can appreciably lower the buckling strength from the fully elastic value. (Author)

AD-265 986 Div. 25
(TIPTP/MFA) OTS price $1.60

Institute of Engineering Research, U. of Calif., Berkeley.
THE PROPAGATION OF SOUND PULSES IN STRATIFIED MEDIA,
by W. Chester. Sep 61, 9p. illus. (Series no. 177, Issue no. 3)
(Contract Nonr-22279)
Unclassified report

DESCRIPTORS: (*Sound transmission, *Acoustics, Surfaces, Velocity, Depth finding, Water, Liquids.) (Equations, Partial differential equations.)

A formal solution is given to the problem of propagation of an acoustic pulse in a medium with a free surface, below which the speed of sound is a slowly decreasing, linear function of depth. The pulse originates from a point source at a fixed depth below the surface. The solution applies in part of the region where the front of the pulse is inclined to the free surface, and can therefore be used to calculate the effect of transverse gradient in velocity of sound on the pulse shape. (Author)

AD-265 992 Div. 25, 2
(TIPTM/GEC) OTS price $5.60

Institute of Engineering Research, U. of Calif., Berkeley.
SOME PROBLEMS IN PLASTICITY.
Final rept., 1 Aug 58-15 Mar 61,
by P. M. Naghdi. Aug 61, 53p. incl. illus. tables, 27 refs.
(Contract DA 04-200-ORD-171)
(AROD rept. no. 2275:4-5)
Unclassified report

DESCRIPTORS: (*Elasticity, *Plasticity, Theory, Mathematical analysis, Temperature, Phase transitions, Stresses.) (Earth, Geology, Seismology, *Geophysics, Astrophysics.)

An investigation, which is still incomplete, was initiated with a view toward the proposal of a model by means of which the temperature distribution within the Earth may be established. It is the purpose of this investigation to provide a completely new approach to the problem, based upon the incremental strain theory of plasticity. Although it may be possible later to distinguish between the various theories proposed based on an elastic-plastic model, it is the immediate purpose to investigate only the present temperature field. This may be done in a manner which avoids detailed knowledge of thermal history. (Author)

AD-265 995 Div. 25, 7
(TIPTP/MFA) OTS price $5.60

Little, Arthur D., Inc., Cambridge, Mass.
A STUDY OF THE DETERMINATION OF THE INTERNAL MECHANICAL IMPEDANCE OF A MACHINE.
Final rept.
31 July 61, 55p. incl. illus. tables.
(Contract NObs-78773, Proj. SF013-1101)
Unclassified report

DESCRIPTORS: (Mechanical properties and Impedance of *Machines, Tests on *Electric motors, Measurement, Excitation.) (Instrumentation, Oscillators, Amplifiers, Accelerometers.) (Equations of Motion, Partial differential equations.) (Experimental data, Tables.) (Mathematical analysis, *Stresses.)

These studies concern the conduct of analyses and experiments aimed toward the development of techniques for determining internal mechanical impedance and internal mechanical mobility of a machine using internal excitation and external measurements. The tests were performed on an electric motor and measurements were made in the vertical direction at the frequencies which exhibited strong internal excitations. (Author)

Division 25-PHYSICS

AD-266 003 Div. 25, 7
(TIPTM/EJH) OTS price $4.60

DuPont de Nemours, E. I., and Co., Inc., Wilmington, Del.
THERMOELECTRIC PROPERTIES OF SELENIDES AND TELLURIDES OF GROUPS VB AND VIB METALS AND THEIR SOLID SOLUTIONS.
Quarterly rept. no. 1,
by W. T. Hicks and J. T. Looby. 10 Oct 61, 40p. incl. illus. tables.
(Contract NObs-84824)
Unclassified report

DESCRIPTORS: (Semiconductors, *Niobium compounds, *Molybdenum compounds, *Selenides, *Thermochemistry, High temperature research, Sintering, Preparation, Electrical properties, Resistance, Hall effect, Density.) (*Electric power production, Power supplies, Generators, *Thermocouples, Tungsten compounds, Tantalum compounds, *Selenides, Bonding, Soldering.) *Intermetallic compounds, *Tellurides.

In a study of the MoSe2-NbSe2 system, the effects of sintering conditions and of deviations from stoichiometry on resistivity, Seebeck coefficient and density were investigated for the pure compounds and for the 1:1 solid solution. The data reported at this time are limited mostly to room-temperature measurements and, therefore, of no immediate practical value, since the thermoelectric figure of merit for these materials is poor at temperatures below 400 C. Concurrent work on the construction of a thermoelectric generator for efficiency and life tests dealt with junction fabrication problems on tungsten selenide. Ultrasonic soldering provides an excellent cold junction, while powered iron, sintered under pressure, promises to provide a satisfactory bonding layer between the selenide and an iron connector plate on the hot side. (Author)

AD-266 009 Div. 25, 7
(TIPTM/EJH) OTS price $1.10

Electro-Optical Systems, Inc., Pasadena, Calif.
HIGH TEMPERATURE SEMICONDUCTING COMPOUNDS FOR THERMOELECTRIC POWER GENERATION.
Bi-monthly progress rept. no. 2, 15 Feb-15 Apr 61,
by C. B. Jordan. 30 Apr 61, 4p. incl. illus.
(Rept. no. 1592-2M-2)
(Contract NObs-84327)
Unclassified report

DESCRIPTORS: (*Semiconductors, Electrical properties, Electrical conductance, Thermal conductivity, *Thermoelectricity, *Electric power production.) (Uranium compounds, Thorium compounds, Sulfides, Synthesis, High temperature research, X-ray diffraction analysis.) Test equipment.

Several runs were made in the high-pressure furnace with the object of synthesizing sulfides of U and of Th. The first run was made using only a small amount of the reactants (U turnings and S) and raising the temperature very slowly to 780 C. After cooling, the reaction product appeared to be an inhomogeneous mixture of sulfides varying in color from brown to dark gray. An attempt to identify the specimen by X-ray diffraction failed. In a second run, U and S were heated to about 2000 C. X-ray diffraction gave a weak pattern of uranium monosulfide, but the presence of other phases cannot thereby be ruled out. The result of a third run, in which U and S were again heated to 2000 C, was an ingot which appeared to have completely melted, and which had a bright metallic luster. An attempt to identify the substance by X-ray diffraction, resulted in a film on which no reflections appeared, and only a light background. Subsequently, a pattern was obtained; however, all attempts to identify the pattern have failed. (Author)

AD-266 010 Div. 25, 7
(TIPTM/EJH) OTS price $1.10

Electro-Optical Systems, Inc., Pasadena, Calif.
HIGH TEMPERATURE SEMICONDUCTING COMPOUNDS FOR THERMOELECTRIC POWER GENERATION.
Bi-monthly progress rept. no. 3, 15 Apr-15 June 61,
by C. B. Jordan. 30 June 61, 4p. incl. illus.
(Rept. no. 1592-2M-3)
(Contract NObs-84327)
Unclassified report

DESCRIPTORS: (*Semiconductors, Electrical conductance, Thermal conductivity, *Thermoelectricity, *Electric power production.) (*Thorium compounds, Selenides, Tellurides.) (Uranium compounds, Sulfides, Selenides.) Synthesis, High temperature research, X-ray diffraction analysis, Test equipment.

Progress was made in the preparation of the U and Th compounds for evaluation as thermoelectric elements. It was decided to synthesize all compounds by a separate operation, and subsequently to use the high-pressure furnace to melt them into ingots. The nominal compositions, ThSe, ThSe2, ThTe, ThTe2, US, US2, USe, and USe2 were synthesized. An increased measure of success was attained with regard to identification of the compounds by X-ray diffraction analysis.

AD-266 021 Div. 25
(TIPTE/CRJ) OTS price $1.60

General Atomic Div., General Dynamics Corp., San Diego, Calif.
HIGH-TEMPERATURE BROAD-BAND SEMICONDUCTORS.
Quarterly technical summary rept. 1 Apr-30 June 61,
by P. H. Miller, Jr. 16 Aug 61, 4p. illus.
(Rept. no. GACD-2495)
(Contract NObs-77144)
(ARPA Order no. 81-59) Unclassified report

DESCRIPTORS: (*Semiconductors, Broadband, High temperature research.) (*Rare earth compounds, Sulfides, Thorium compounds, Phosphides.) (Praseodymium compounds, Cerium compounds, Sulfides, Chemical impurities with Barium.)

Efforts were continued on the study and development of new semiconductor materials for the direct conversion of heat to electricity in the temperature range above 800 K. The major work was on rare earth sulphides with the Th3P4 deficiency structure. (Author)

AD-266 044 Div. 25, 26, 8
(TIPTE/DLW) OTS price $1.60

Whirlpool Corp., St. Joseph, Mich.
THERMOELECTRIC TEMPERATURE CONTROL IN AN/URQ-9

FREQUENCY STANDARD.
Interim development rept. no. 2, 1 July-30 Sep 61, by R. G. Sickert and A. F. Martz. 20 Oct 61, 16p. incl. illus.
(Contract NObsr-85314, Proj. SS-294001)
Unclassified report

DESCRIPTORS: (*Crystal ovens, Radiofrequency, Frequency, Standards, *Thermoelectricity, *Temperature control, Heat exchangers, Design.) (*Laboratory furnaces, Laboratory equipment, Crystals, Processing, Growth.)

The final crystal chamber design is presented and a summary is given of progress made in fabricating the components of the assembly. The status of the temperature regulator circuits is also reported. All parts except the thermoelectric modules were fabricated and the inner sink - inner oven assembly was completed and partially tested. The modified inner oven regulator operated satisfactorily. Design of the inner sink regulator was nearly completed and the circuit functioned as expected. (Author)

AD-266 062 Div. 25, 7, 14
(TIPSM/EJH) OTS price $1.10

Titanium Alloy Manufacturing Div., National Lead Co., Niagara Falls, N. Y.
THERMOELECTRIC MATERIALS.
Bimonthly progress rept. no. 10, 1 July-31 Aug 61, by Merton H. Brooks. 15 Sep 61, 4p.
(Contract NObs-78326, Proj. SR-007-12-01)
Unclassified report

DESCRIPTORS: (*Thermoelectricity, *Electric power production, Semiconductors, Materials, *Ceramic materials, High temperature research.) (*Rare earths, *Rare earth compounds, Oxides, Garnets, *Niobates, Preparation, Synthesis.) (Lithium compounds, Titanium compounds, Oxides with Bismuth compounds or Thorium compounds or Cerium compounds or Antimony compounds, Oxides, Thermoelectricity, Resistance, Electrical properties.) Lead compounds, Tin compounds, Yttrium compounds.

Preparation and synthesis of the following ceramic materials are discussed: Simple Oxides (Standard Series of Additions of TiO_2, ZrO_2, SnO_2, PbO_2 to La_2O_3 and Y_2O_3, La_2O_3, UO_2, Nb_2O_5 to CeO_2); Multiple Oxides (ABO_3-Type Compounds; ABO_4-Type Compounds; $PbNb_2O_6$ and $Pb_2Nb_2O_7$). Fabrication of shapes: Standard Ceramic Bodies of Li_2TiO_3 with additions of ThO_2 were completed, sintering conditions, bulk densities and porosities are presented. Standard Ceramic Bodies of $BaTiO_3$ plus La_2O_3 and Nb_2O_5 were prepared. The Seebeck coefficients and resistivities at high temperatures are tabulated for Li_2TiO_3 with various additions of Bi_2O_3, or ThO_3, or CeO_2, or Sb_2O_5.

AD-266 065 Div. 25
(TIPTM/TCG) OTS price $1.10

National Bureau of Standards, Washington, D. C.
THERMAL CONDUCTIVITY OF SEMI-CONDUCTIVE SOLIDS; METHOD FOR STEADY-STATE MEASUREMENTS ON SMALL DISK REFERENCE SAMPLES.
Technical progress rept. 1 Apr - 30 June 61, by D. R. Flynn. 17 Aug 61, 6p. incl. illus.
(NBS rept. no. 7323)
Unclassified report

DESCRIPTORS: (*Solids, *Semiconductors, Test methods for Measurement of Temperature, Conductivity on Disks.) (Laboratory equipment, Materials, Platinum alloys, Rhodium alloys and Aluminum compounds, Oxides.) Thermodynamics, Determination.

The salient features of the final model of an absolute cut-bar apparatus suitable for thermal conductivity measurements on small solids at temperatures up to 1200 C or higher are described. The high temperature portions of the apparatus which will contact the specimen are 60% Pt -40% Rh alloy. The remaining high temperature structural portions are high purity (99+%) Al_2O_3. Construction of the apparatus was completed and initial check measurements started. A brief summary of initial measurements to be made with the apparatus is given. (Author)

AD-266 082 Div. 25, 14, 4
(TIPTM/TCG) OTS price $1.10

Ohio State U. Research Foundation, Columbus.
THERMOELECTRIC MATERIALS.
Bimonthly progress rept. no. 5, 1 Sep-31 Oct 60, by Henry E. Wenden, S. R. Ali Zaidi, and Thomas S. Shevlin. 19 May 61, 4p. illus.
(Contract NObs-78254)
Unclassified report

DESCRIPTORS: (*Thermoelectricity, Materials, Sodium compounds, Vanadium compounds, Oxides, Effectiveness of Temperature on Electric potential in Controlled atmospheres.) (Ceramic materials, Mullite, Corrosion, Films, Metals, Solutions or Precipitation.) Electrical properties.

The effect of temperature difference on the emf in the molten temperature range of $Na_2O.6V_2O_5$ was studied. The variation of emf in H, He, and O atmospheres showed that emf increased from 50 to 700 degree C as delta T decreased from 250 to 95 C; emf tended to decrease with time. Reducing atmospheres decreased emf/degree C for the same delta T. Ceramic (mullite) tubes developed extreme corrosion and creep when utilized in long-time experiments. The possibility of utilizing metal tubes was investigated. The very low emf generated and negligible influence of atmospheres apparently resulted from corrosion leading to oxide film and to metal solution and/or precipitation ..

AD-266 094 Div. 25, 4
(TIPTM/TCG) OTS price $1.10

Pittsburgh U., Pa.
RARE EARTH CHALCOGENIDES.
Technical progress rept., 1 Apr-1 June 61, by August R. Freda. 21 June 61, 5p. incl. tables.
(Contract NObs-77068)
Unclassified report

DESCRIPTORS: (*Thermoelectricity, *Rare earths, *Rare earth compounds, *Cesium compounds, Oxides or Sulfides, Synthesis, Sintering.) (Materials, Density, Volume, Resistance, Measurement.) Physical properties, Electrical properties.

Synthesis of pure Ce_2S_3 by reacting CeO_2 with CS_2 at temperatures from 800 to 1100 C produced a material which failed to agree with ASTM X-ray data for Ce_2S_3. The CeO_2 was compacted so that synthesization and sintering occurred simultaneously. The volume, density, and resistivities of the compacts were measured.

Division 25-PHYSICS

AD-266 097 Div. 25, 4
(TIPTM/TCG) OTS price $1.10

Pittsburgh U., Pa.
RARE EARTH CHALCOGENIDES.
Technical progress rept. 1 Sep-30 Nov 60,
by August R. Freda. 1 Dec 60, 4p. incl. tables.
(Contract NObs-77068)
Unclassified report

DESCRIPTORS: (*Thermoelectricity, Materials, *Rare earths, *Rare earth compounds, *Cesium compounds, Oxides or Sulfides, Synthesis.) (Synthesis, Additives and Graphite in Hydrogen compounds or Carbon compounds, Sulfides, Reduction, Controlled atmospheres.) (Silicon compounds, Carbides, Sintering furnaces.) X-ray diffraction analysis.

Attempts to synthesize Ce_2S_3 by doping were studied. Doping CeO_2 with various additives failed to reduce the resistivity below 1000 megohm/cm. Graphite additions produced a mechanical mixture which had a lower resistivity. Attempts were made to prepare Ce_2S_3 by utilizing H_2S (1200 to 1400 C) and CS_2 (750 to 850 C) as reducing agents in a SiC tube furnace. Ce_2O_2S was synthesized along with various unidentified compounds. X-ray diffraction pattern data were obtained.

AD-266 098 Div. 25
(TIPTP/MFA) OTS price $2.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
EXCITATION OF ACOUSTICAL WAVES IN A PLASMA,
by T. Morrone. 19 June 61, 24p. incl. illus.
(Rept. no. PIBMRI-893-61)
(Contract AF 30(602)2045)
(RADC TN 61-201) Unclassified report

DESCRIPTORS: (*Excitation, *Acoustics, *Electromagnetic waves, *Plasma physics, Electrostatics, Pressure, Velocity, Wave transmission, Magnetic fields, Energy.) (Perturbation theory, Nonlinear systems, Partial differential equations.) Wiring diagrams.

The possibility of putting significant amounts of power into the acoustical wave by a suitable choice of parameters characterizing the plasma and the incident wave is investigated. They are, plasma density, collision frequency, angle of incidence and electromagnetic wave frequency. The conclusion reached is that it is not possible under ordinary laboratory conditions to transfer significant power to the acoustical wave, and that in problems of propagation in a plasma, acoustical wave considerations may be neglected with very little error. The conclusions are based on a small signal linear analysis, and are subject to the model of the plasma assumed, i.e., a neutral weakly ionized uniform plasma with electron, ion, and neutral temperatures equal except for small perturbations. In an appendix the assumptions and development which lead to the dynamical equations used in this analysis are discussed, and a quantitative estimate is made of the region where the small signal analysis is valid. Above a certain power level the equations become nonlinear. (Author)

26. PRODUCTION AND MANAGEMENT

AD-265 573 Div. 26, 17
(TIPTM/BRW) OTS price $3.60

Westinghouse Electric Corp., Blairsville, Pa.
HIGH ENERGY RATE EXTRUSION.
Interim technical progress rept. no. 4, on phase 2, 1 July-30 Sep 61,
by J. M. Rippel. Oct 61, 12p. illus. tables.
(Contract AF 33(600)41948)
(ASC TR 7-882, vol. 4) Unclassified report

DESCRIPTORS: (*Machine tools, Metals, *Extrusion, Explosive forming, Pneumatic systems, Hydraulic systems, Operation, Dies, Tools, Design, Temperature, Lubrication, Glass.) (Extrusion, Steel, Stainless steel, Titanium alloys, Vanadium alloys, Aluminum alloys, Surface properties, Microstructure.) Airframes, Aircraft, Guided missiles, Spaceships, Satellite vehicles.

An investigation into the parameters associated with Dynapak extrusion has been undertaken. Results have been obtained on lubrication, billet end geometry, die entrance angle, reduction ratio and temperature. Volume of material extruded vs power requirements for Ti alloy, 304 stainless steel and type 4340 steel at the various temperatures and reduction ratios are presented. The problem of inertial separation is analyzed and data along with the calculation of the factors that effect this phenomenon are shown. A brief description is given of the instrumentation used for measuring velocities and forces. Nine ft of Al and 6 ft of Ti were extruded in the form of 50-mil T sections. (Author)

AD-265 665 Div. 26, 17
(TIPTM/SEB) OTS price $4.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
CONTROL OF THE TEMPERATURE OF POURING AND TAPPING OF STEEL AND THE ACCURACY OF MEASUREMENT REQUIRED,
by I. A. Andreyev. 28 Aug 61, 43p. incl. tables (Trans. no. MCL-1008 of Metallurgiya, Sbornik Statey 2:89-114, 1959)
Unclassified report

DESCRIPTORS: *Steel, Production, Temperature, Measurement, Pyrometers, Radiation pyrometers, Thermocouples, Technological intelligence, Translations, USSR.

A discussion is presented on the practicability and accuracy of optical pyrometers for measuring the temperature of molten steel during production. (Author)

AD-265 671 Div. 26, 17
(TIPTM/GEC) OTS price $2.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
THE PROPERTIES OF SINGLE-PHASE WELDABLE TITANIUM ALLOY,
by S. M. Shul'kin and A. M. Yamshchikova. 4 Aug 61, 20p. incl. tables (Trans. no. MCL-1018 of Metallovedeniye, Sbornik Statey, Leningrad 3:358-366, 1959)
Unclassified report

DESCRIPTORS: (*Titanium alloys, Heat resistant alloys, Welding, Aluminum alloys, Tin alloys, Zirconium alloys.) (Ship hulls, Metal plates, Sheets, Mechanical properties.) (Technological intelligence, Translations, USSR.)

AD-265 685 Div. 26, 9
(TIPTE/CRJ) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
A HIGH-SPEED ELECTRODYNAMIC MEMBRANE VALVE,
by G. Ya. Umarov, A. Alimov, and N. F. Ovechkin. 3 Oct 61, 2p. incl. illus. (Trans. no. MCL-1111 of Byulletin' Izobreteniy 9:pp. 57, 1960)
Unclassified report

DESCRIPTORS: (*Gas valves, *High-vacuum valves, Membranes, USSR, Design.)

A high-speed electrodynamic membrane valve is described for the admission of small amounts of gas into a high-vacuum chamber. It consists of a plate and a spiral beneath the plate through which an electric capacitor discharge current is passed when the valve is opened. It has the following special feature: in order to reduce the valve opening time to 10-20 microseconds, and regulate this time, the plate is made in the form of an elastic diaphragm, pressed against the seat by the central pressure control screw. (Author)

AD-265 688 Div. 26, 17
(TIPTM/REB) OTS price $2.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
METAL WELDING BY ELECTRON BEAM,
by V. V. Bashenko. 21 Aug 61, 21p. 16 refs.
(Trans. no. MCL-1171 of Svarochnoye Proidvodstvo 1:34-37, 1961)
Unclassified report

DESCRIPTORS: (USSR, Translations, Technological intelligence.) Metals, Alloys, *Welding, Electric welding, Electron beams, Electron guns.

A study was made of welding by electron beam in a vacuum. The essential components for electron beam welding include the electron gun, the vacuum chamber in which the welding takes place, the system of clamping and shifting the parts being welded, and the system of electric power supply and control. Welding of electron beam is suitable for welded seams of the butt, overlap, angular, rivet, and other types. Materials of varied thicknesses may also be welded by this method.

AD-265 693 Div. 26
(TIPTM/BRW) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
A GAS LUBRICATED BEARING,

by S. A. Sheynberg. 13 Oct 61, 4p. incl. illus. (Trans. no. MCL-1227 of Byulleten Izobreteniy 16, 1960)

Unclassified report

DESCRIPTORS: (Bearings, Journal bearings, *Gas bearings, Bushings, Design.) (Lubrication by Gases.) (Technological intelligence, Translations, USSR.)

The gas-lubricated bearing, a one-piece cylindrical sleeve, fitted with an aperture on one side for gas supply under pressure, is distinguished by the fact that, in order to increase the dynamic stability of the shaft in rotation and the ease of starting, a longitudinal groove is made in the sleeve, which supplies gas through the above mentioned aperture, and in the wall of the sleeve, opposite the logitudinal groove, supplementary curved grooves with capillary apertures for the gas supply are made. The finished form of the tearing is distinguished by the fact that in order to simplify manufacture of the apertures, two annular capillary borings, having an operating cross section smaller than the operating cross section of the supply apertures, are made at the ends of the bearing. (Author)

AD-265 702 Div. 26, 17
(TIPTM/BRW) OTS price $3.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
EVOLUTION OF STAMPING PROCESSES,
by A. B. Rebel'skiy. 4 Oct 61, 32p. 11 refs. (Trans. no. MCL-1248 of Vestnik Mashinostroyeniya 2:37-45, 1961)

Unclassified report

DESCRIPTORS: (*Industrial production, *Mechanical engineering, Machines, Automation.) (Metal forming presses, Hydraulic presses, Forge presses, Operation, *Forging, Extrusion, Deformation, Plastic flow, Metals.) (Technological intelligence, Translations, USSR.)

AD-265 708 Div. 26
(TIPTM/GEC) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
THE REPLACEMENT OF OIL-LUBRICATED SLIDING BEARINGS WITH WATER-LUBRICATED BEARINGS,
by Ye. V. Trofimov. 18 Sep 61, 2p. incl. illus. (Trans. no. MCL-1294 of Promyshlennaya Energetika 6:15,16, 1960)

Unclassified report

DESCRIPTORS: (Feed pumps, Feed water, *Bearings, Thrust bearings, Hydrostatic pressure, Hydrodynamics, Lubrication, Design.) (*Lubrication by *Water.) (Technological intelligence, Translations, USSR.)

A design is presented for support and thrust bearings using simultaneously hydrodynamic and hydrostatic lifting forces. In this case the thrust bearing as does the ordinary hydrodynamic bearing, has thrust sections with wedge-shaped terraces. During rotation of the thrust disc a hydrodynamic lifting force resulting from the viscosity of the fluid is created on these terraces. In contrast to the hydrodynamic bearing, baffle collars are located along the perimeter of this bearing, and there are baffle apertures through which the fluid is fed under pressure. (Author)

AD-265 710 Div. 26, 17
(TIPTM/BRW) OTS price $6.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
ROLLED SHAPES (Profili Prokata),
by E. R. Shor and I. R. Shor. 18 Sep 61, 63p. incl. illus. (Trans. no. MCL-1297 of Vsesoyuznoye Obshchestvo Po Rasprostraneniyu Politicheskikh i Nauchnykh Znaniy, 46p., 1960)

Unclassified report

DESCRIPTORS: (*Rolling mills, Metal plates, Sheets, Beams, Rods, Reinforcing steel, Wire, Pipes, Steel tubing, Steel wire.) (Technological intelligence, Translations, USSR.) Manufacturing methods, Production, Configuration.

Contents:
Certain information on the production of pig iron, steel and rolled products
How rolled products are made
  Assortment of rolled products
  Rolling mills
  Production of merchant and sheet metal
  Tube rolling
Economical rolled shapes
  An efficient assortment and expansion of the output of lightened rolled shapes
  Rolling of special and periodic shapes
  Increasing the accuracy of rolled products
The future of rolled products
  The development of the rolled-stock production
  Rolling mill of the future
Special terminology

AD-265 711 Div. 26, 17
(TIPTM/GEC) OTS price $4.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
THE FORGING AND STAMPING INDUSTRY IN THE USSR,
by I. I. Krymskiy. 1 Oct 61, 41p. incl. illus. tables (Trans. no MCL-1299 of Kuznechno-Shtampovochnoye Proizvodstvo v SSSR, Izdatel'stvo Znaniye, pp. 1-31, 1959)

Unclassified report

DESCRIPTORS: (*Industrial production, *Manufacturing methods, Precision finishing, Automation.) (Metal forming presses, Forge presses, Hydraulic presses, Hammers, *Forging, Extrusion, Welding, Sheets, Metals.) (Technological intelligence, Translations, USSR.)

AD-265 735 Div. 26, 17
(TIPTM/BRW) OTS price $4.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
PROGRESSIVE FORGING PRACTICE (SELECTED ARTICLES).
13 Sep 61, 42p. (Trans. no. MCL-1385 of Peredovoy Opyt Kovki, pp. 79-87, 96-102 and 116-133, 1959)

Unclassified report

DESCRIPTORS: (*Steel, Deformation, Processing, *Forging, Extrusion, Metal forming presses, Forge presses, Industrial production.) (Technological intelligence, Translations, USSR.)

Contents:
Hot pressing of steel ingots instead of forging, by Yu. F. Chernyy
Forging of large size forged pieces with reduced forging allowance oversize and minimum deviations from given dimensions, by N. F. Misyagin
Exploitation of a hammering (forging) press with 12000-ton pressure, by B. A. Trifonov

AD-265 765 Div. 26, 17, 27
(TIPTM/SEB) OTS price $2.60

Lyon, Inc., Detroit, Mich.
DEEP DRAWN AUSFORMING DEVELOPMENT PROGRAM 12'' DIA. ROCKET MOTOR CHAMBERS,
General rept. no. 2 for period ending 30 Sep 61, by Wayne A. Martin. 30 Sep 61, 23p. incl. illus. table.
(Contract NOw 60-0634)
Unclassified report

DESCRIPTORS: (*Rocket motors, *Rocket cases, Combustion chambers, Manufacturing methods.) (*Steel, Austenite, Processing, *Drawing (Machine processing), Heat treatment, Pickling.) (Microstructure, Mechanical properties, Tensile properties, Deformation, Temperature, Tests.) Phosphate coatings.

The recommended deformation temperature range is 1100 to 1200 F for ausforming of 300-M steel. This temperature range results in good tensile properties with a minimum of non-martensitic transformation products. Deformations of at least 50% must be attained to achieve yield strengths of over 300,000 psi. The best combination of strength and ductility is obtained by tempering between 600 and 700 F. The deformed austenite can be held at 1000 F without deterioration of properties. (Author)

AD-265 770 Div. 26, 17, 31
(TIPTM/SEB) OTS price $4.60

Miami Shipbuilding Corp., Fla.
THE MACHINING AND GRINDING OF TITANIUM HYDROFOILS,
by T. C. Buhler. 1960, 41p. incl. illus. tables.
(Rept. no. R-130)
(Contract NObs-72245)
Unclassified report

DESCRIPTORS: *Hydrofoils, *Titanium alloys, Machining, Processing, Milling machines, Coolants, Cutting tools, Grinders, Abrasives.

Fabrication of 2 identical hydrofoils of cylindrical section, one each from 2 different grades of Ti-alloy, hot rolled, annealed, flat bar stock is discussed. The report includes details of tools, equipment, grinding media, coolants, speeds, feeds, tool wear, and breakage, belt life, pressures and other pertinent data. Statistics on times for metal removal, tolerances and differences experienced between the two alloys are indicated. (Author)

AD-265 840 Div. 26, 17
(TIPTM/SEB) OTS price $3.60

Brush Beryllium Co., Cleveland, Ohio.
ROLLING IMPROVED BERYLLIUM SHEET.
Quarterly rept. no. 1, 5 July-4 Oct 61,
by E. M. Grala, R. G. O'Rourke and others.
4 Oct 61, 24p. incl. tables, 11 refs. (Technical rept. no. 231-234)
(Contract AF 33(600)43037)
Unclassified report

DESCRIPTORS: (*Beryllium, Sheets, Processing, Manufacturing methods.) (Rolling mills, Chemical milling, Heat treatment, Grinders, Pickling.) (Mechanical properties, Surface properties.)

An improved Be sheet with high mechanical properties in a flat condition with good reproducibility is being developed. A review of literature concerned with Be sheet production was made. This program will consist of investigations of (1) rolling parameters and processes, (2) isotropic ductility, (3) pilot production and (4) production. The investigation of rolling parameters was initiated. Preliminary studies were initiated on the isotropic ductility phase of the program. Finishing operations on currently produced Be sheet are being investigated. (Author)

AD-265 922 Div. 26, 17, 1
(TIPTM/BRW) OTS price $5.60

Northrop Corp., Hawthorne, Calif.
DEVELOPMENT OF IMPROVED METHODS, PROCESSES, AND TECHNIQUES FOR PRODUCING STEEL EXTRUSIONS.
Interim engineering rept. no. 9, 1 July-30 Sep 61,
by L. M. Christensen. Oct 61, 53p. incl. illus. tables (Rept. no. NOR-61-245)
(Contract AF 33(600)36713)
Unclassified report

DESCRIPTORS: (*Steel, *Stainless steel, *Extrusion, Hydraulic presses, Operation, Dies, Materials, Design, Lubrication, Glass textiles.) (Heating, Induction heating, Nickel plating, Contamination, Chemical milling, Heat treatment, Drawing (Machine processing), Scheduling, Processing.) *Airframes.

Extrusion techniques to produce ultra thin high alloy extrusions of 0.06-in. thickness were shown and confirmed to have a reproducibility of a high order of magnitude. Further improvement in producibility was effected by demonstrated ability to produce these sections without the previously utilized 0.04-in. thick nickel plate on the billets. (Author)

AD-265 935 Div. 26, 17, 1
(TIPTM/BRW) OTS price $6.60

Northrop Corp., Hawthorne, Calif.
PROGRAM FOR THE DEVELOPMENT OF EXTRUDED BERYLLIUM SHAPES.
Interim engineering rept. no. 13, 1 June-31 Aug 61,
by L. M. Christensen. Aug 61, 63p. incl. illus. tables (Rept. no. NOR-61-236)
(Contract AF 33(600)36931)
Unclassified report

DESCRIPTORS: (*Beryllium, *Extrusion, Dies, Design, Lubrication, Metal coatings, Containers, Steel tubing, Copper coatings, Mica.) Airframes, Beams, Surface properties, Pickling, Mechanical properties, Tensile properties.

Successful completion of Phase I extruding development demonstrated techniques by which aircraft structural shapes can be extruded from pure beryllium. Pilot production of five 20-ft lengths of a 0.12-x1.0-x1.5-in. structural channel proved acceptability and reproducibility of the developed process. Excellent dimensional integrity and surface quality, consistent freedom from defects, and high strength with relatively high ductility were achieved in pilot production. The prime contributing factor to this success was the change of technical approach from the Sejournet glass lubrication system to Nuclear Metals newly developed refinement of the canned or clad technique designated composite lubricant system. (Author)

AD-266 016 Div. 26
(TIPTM/BRW) OTS price $5.60

General Electric Co., Schenectady, N. Y.
GEOMETRY EFFECTS ON THE THRESHOLD OF HALF-FREQUENCY WHIRL IN GAS-DYNAMIC JOURNAL BEARINGS,
by B. Sternlicht and L. W. Winn. 16 Oct 61, 34p. illus. tables.
(Contract Nonr-284400, Proj. NR 097-348)
Unclassified report

DESCRIPTORS: (*Bearings, *Journal bearings, *Gas bearings, Bushings, Hydrostatic pressure, Hydrodynamics, Design, Stability.) (Lubrication, Gases.) (Test equipment, Rotating structures, Shafts, Oscillation, Load distribution, Orifices.) (Journal bearings, Configuration.)

Various groove arrangements and orifices were used to raise the threshold of Half-Frequency Whirl (HFW). Experimental results on several different bearing geometries are presented. The threshold of HFW was markedly influenced by the position of a small orifice with a 0.020 in. diam with respect to the load vector, and by grooves and their location with respect to the load vector. The load carrying capacity of a grooved bearing is largely dependent on the number of grooves and their position with respect to the load vector. The lower the attitude angle the higher the threshold of HFW. Hybrid bearings can be designed with high threshold of HFW. Unless properly designed, however, they have much smaller load carrying capacity than plain cylindrical journal bearings. (Author)

27. PROPULSION SYSTEMS

AD-265 513 Div. 27, 10, 4
(TIPTM/EJH) OTS price $2.60

Armour Research Foundation, Chicago, Ill.
ABSTRACTS OF PAPERS ON SECOND AFOSR CONTRACTORS' MEETING ON CHEMICAL KINETICS OF PROPULSION 11-12 SEPTEMBER 1961.
12 Sep 61, 21p.
(Contract AF 49(638)847)
(AFOSR-1417)
Unclassified report

DESCRIPTORS: (*Rocket propulsion, Theory, Rocket propellants.) (*Supersonic flow, Gas flow, Jets, *Nitrogen, Excitation, Heat transfer.) (*Free radicals, Molecular beams, Ion beams, Hydrogen, Ions, Deuterium, Chemical reactions.) Conferences, Abstracting, Gases. (*Free radicals, Ions, Electrons, *Plasma jets, Flames, Flame propagation.) Dissociation, Thermochemistry, Chemical reactions, Oxidation. Pyrolysis, Combustion, Recombustion reactions, Decomposition, Reaction kinetics, Photolysis, Low temperature research, Test methods, Test equipment, Mass spectroscopy.

Contents: Atom concentrations in supersonic streams; Chemical reactions using free radical beams; Ion-electron recombination kinetics; DChemical synthesis with monoenergetic ions; Dissociation of halogens in shock waves; Reactions of free radicals containing N; Study of the hydrodynamic equations for free-radical flames; Kinetics of energetic species at low temperatures; Thermochemistry of free radicals; Photochemical decomposition of ozone; Kinetics of the oxidation of boranes and borane derivatives; Kinetics of H-O and hydrocarbon-O reactions; Pyrolysis and combustion of Al alkyls; Reactions between excited molecules and molecular fragments.

AD-265 515 Div. 27, 14
TIPTM/EJH) OTS price $1.60

Aerojet-General Corp., Azusa, Calif.
DEVELOPMENT OF IMPROVED HIGH-STRENGTH PRE-IMPREGNATED MATERIALS FOR FILAMENT-WOUND ROCKET MOTOR CASES.
Informal progress rept. no. 3, 1-30 Sep 61, by E. L. Rucks. 16 Oct 61, 11p. incl. tables.
(Rept. no. L0525-01-3)
(Contract NOw-61-0642-c)
Unclassified report

DESCRIPTORS: (*Rocket cases, *Filament wound construction, Materials, Pressure, High pressure research, High temperature research.) (*Fibers, *Filaments, *Glass textiles, Binders, Resins, Heat resistant polymers, Impregnation.)

The first experimental lot (Lot 1) of HTS glass roving was received during this period and is presently being evaluated. This lot showed an approximate 10% increase in ultimate tensile strength (strand test) over the control lot. The weight per yard and the ignition loss were well within the specification range. All test specimens have been fabricated from this lot and are awaiting tests. This material has been sent to the vendor for controlled impregnation. (Author)

AD-265 606 Div. 27
(TIPTM/EJH) OTS price $3.60

Arde-Portland, Inc., Paramus, N. J.
COOLED SOLID PROPELLANT ROCKET NOZZLES.
Summary rept. no. 1, 20 June-30 Sep 61, by R. H. Alper. 30 Sep 61, 32p. incl. illus. 28 refs.
(Contract DA 30-069-ORD-3099)
Unclassified report

DESCRIPTORS: (Solid rocket propellants, Rocket motors, *Rocket motor nozzles, Design, Cooling, Film cooling, Heat transfer, Thermal insulation.) (Coolants, Liquid metals, Lithium, Water.) (Cooling, Convection, Spray nozzles.) (Bibliography, Ablation, Sweat cooling, Heat transfer, Cooling.) Nozzles, Insulating materials, Thermal insulation, Phenolic resins, Asbestos fibers, Graphite.

The feasibility of applying liquid rocket engine cooling techniques to solid rocket nozzles was studied. Some of the more promising techniques include using liquid Li as the coolant. The nozzle to motor case adaptor design was completed. The spray film cooled nozzle was secured from the vendor and subjected to cold flow tests. Setup of the lithium flow system console and the control panel were completed. Preliminary tests of the instrumentation, controls and heating circuits were started. A summary of data derived from the literature on cooled solid rocket nozzles is presented. (Author)

AD-265 670 Div. 27
(TIPTA/WAW) OTS price $12.50

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
ASSEMBLY OF AIRCRAFT ENGINES (Sborka Aviatsionnykh Dvigateley),
by V. N. Belikov and A. N. Nikitin. 4 Aug 61, 170p. incl. illus. (Trans. no. MCL-1016 of Gosudarstvennoye Izdatel'stvo Oboronnoy Promyshlennosti Moskva:120p., 1959)
Unclassified report

DESCRIPTORS: (*Airplane engines, *Turbojet engines, Manufacturing methods, *Rocket motors.) (Axial flow compressors, Combustion chambers, Gas turbines, Gears, Centrifugal compressors, Fuel pumps, Manufacturing methods.) (USSR, Technological intelligence, Translations.) (Manufacturing methods, Tools, Quality control.) (Aviation personnel, Training, Students.)

A training text is discussed which contains basic data on the planning, organization of technological processes and the precision assembly of aircraft engines. Methods are described for carrying out the preparatory operations; data are given on the basic linkages and connections used during assembly. Examples are presented of the assembly of units and of the engines of various types. The book is a training text for students in advanced schools and technical schools for preparation in passing the course Assembly of Aircraft Engines. (Author)

AD-265 700 Div. 27, 9
(TIPTW/WAW) OTS price $2.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
SELECTION OF EFFICIENT HEATING SURFACES FOR HEAT REGENERATORS OF GAS TURBINE PLANTS,
by L. G. Gel'fenbeyn. 18 Sep 61, 24p. incl. illus. (Trans. no. MCL-1242 of Izvestiya Akademii Nauk SSSR - Otdeleniye Tekhnicheskikh Nauk - Energetika I Avtomatika 1:62-69, 1960)
Unclassified report

DESCRIPTORS: (*Heat exchangers, Turbojet engines, Design, Sheets, Tests, Heat transfer, Gas flow, Fluid flow, *Gas turbines.) (Heat exchangers, Surfaces, Heating.) (USSR, Technological intelligence, Translations.

As a result of investigations of efficient designs of heating surfaces for heat regenerators of gas turbine plants a new sheet was developed for heating surfaces of heat exchangers constituted of corrugated sheets with fine-grained bulges. The results of experimental investigations and juxtaposition of various heating surfaces according to their heat yield showed the high efficiency of heating surfaces constituted of corrugated sheets with fine-grained bulges. Banks of pipe elements constituted of sheets with a new profile, have a greater strength owing to seam welding along their entire length. The tests covered a range of Re values from 4,000 to 15,000. Thus, the range of Re values corresponding to the actual operation of heat regenerators of gas turbine plants was covered by the tests. The formulas for the determination of optimal flow velocities and their ratios, developed according to the devised procedure and on the basis of experimental data from the investigation of the new heating surface, ensure its best utilization for the operation of heat regenerators of gas turbine plants. (Author)

AD-265 705 Div. 27, 9, 10
(TIPTM/BRW) OTS price $3.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
THE ATOMIZATION OF LIQUID FUEL BY MEANS OF PNEUMATIC INJECTORS,
by L. A. Vitman, B. D. Katsnel'son, and M. M. Efros. 21 Sep 61, 39p. incl. illus. tables, 13 refs. (Trans. no. MCL-1287 of Voprosy Aerodinamiki i Teploperedachi v Kotel'no-Topochnykh Protsessakh, Moskva, pp. 5-34, 1959)
Unclassified report

DESCRIPTORS: (Atomization, Liquids, *Fuels, Fuel nozzles, *Fuel injections, Pneumatic systems, Jets, Jet mixing flow, Jet acoustic oscillations, Mathematical analysis.) (Fluids, Kerosene, Gasoline, Mixtures, Glycerols, Water, Air, Atomization, Tests.) (Technological intelligence, Translations, USSR.)

The application of the theory of similitude to problems of the atomization of a viscous liquid in air injectors resulted in a criterial function for determining the mean diameter of the drops of an atomized jet. No change was noted in the fineness of atomization along the jet. A formula is given for determining the degree of uniformity of the drops (size distribution). (Author)

AD-265 740 Div. 27
(TIPTW/WAW) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
DUAL FLOW, DUCTED FAN OR TURBO-FAN PROPULSION UNITS (Dvouproudove Pohonne Jednotky),
by Josef Sichtar. 19 Sep 61, 8p. (Trans. no. MCL-1404 of Letecky Obzor 1:16-17, 1961)
Unclassified report

DESCRIPTORS: (*Turbofan engines, Design, Effectiveness.) (USSR, Technological intelligence, Translations.)

AD-265 804 Div. 27
(TIPTM/BRW) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE INFLUENCE OF DOUBLE-CONTOUR PARAMETERS ON THE SPECIFIC THRUST AND THE SPECIFIC FUEL CONSUMPTION OF DOUBLE-CONTOUR TURBOJETS.
by A. L. Klyachkin and I. A. Konshin. 6 Oct 61, 19p. incl. illus. (Trans. no. FTD-TT-61-44 of Izvestiya Vysshikh Uchebnykh Zavedeniy, Aviatsionnaya Tekhnika 3:100-112, 1961)
Unclassified report

DESCRIPTORS: (*Turbojet engines, Compressors, Configuration, Thrust, Fuel consumption, Design, Nomographs.) (Technological intelligence, Translations, USSR.)

A nomogram is presented for calculating the parameters of double-contour turbojets (DCTJ's) that makes it possible to: (1) estimate the relative and absolute effect of using the second contour in a turbojet; and (2) determine the structural system of DCTJ's, in particular the number of stages of the compressor and turbine of the second contour. (Author)

AD-265 841 Div. 27, 17
(TIPTM/SEB) OTS price $9.60

Budd Co., Philadelphia, Pa.
DEVELOPMENT OF HIGH PERFORMANCE ROCKET MOTOR CASE.
Quarterly engineering progress rept. no. 15, 1 July-30 Sep 61,
by R. C. Dethloff. 30 Sep 61, 120p. incl. illus. tables.
(Contract DA 36-034-ORD-3296)
Unclassified report

DESCRIPTORS: (Rocket motors, *Rocket cases, Materials, Design, Welding, Welded joints.) (Steel with Nickel alloys, Chromium alloys, Molybdenum alloys, Stainless steel.) (Titanium alloys with Aluminum alloys, Vanadium alloys, Tin alloys.) (Heat treatment, Pickling, Welding, Electron beams, Spot welding.) (Mechanical properties, Tensile properties, Fracture (Mechanics), Tests, Test methods, Microstructure.)

Data obtained from evaluation testing on PH-12-8-6 alloy, Ti 6Al-6V-2Sn alloy, and Ti 8Al-10V alloy are reported. Evaluation testing of the 20% Ni steel and 25% Ni steel of a modified analysis employing increased percentages of Al and Ti in the composition, is in process. Fracture toughness and tensile specimens of as-rolled strip were prepared. Tensile specimens of AM 357 alloy are being prepared. Data on electron beam welded uniaxial joints in Ti-13V-11Cr-3Al alloy and JLS 300 alloy are reported. Design of 20 in. dia. sub-scale chambers to be constructed and tested is included. Drawings of the automatic welding fixture being manufactured to weld the helical pattern of the cylindrical section are shown. (Author)

AD-265 917 Div. 27, 14
(TIPTM/BRW) OTS price $1.10

Naval Research Lab., Washington, D. C.
PREDICTION OF FAILURE DUE TO MECHANICAL DAMAGE IN THE OUTER HOOP WINDINGS IN A FIBERGLASS PLASTIC PRESSURE VESSEL,
by J. A. Kies. 25 Sep 61, 6p. incl. illus.
(Technical memo. no. 170)
(Proj. 62R05-19A)
Unclassified report

DESCRIPTORS: (Filament wound construction, Glass textiles, Fibers, Filaments, Plastics, Laminates, *Pressure vessels, *Failure (Mechanics), Mathematical prediction., Mathematical analysis.) *Rocket cases.

AD-265 918 Div. 27, 30
(TIPTM/BRW) OTS price $1.60

Naval Research Lab., Washington, D. C.
NONDESTRUCTIVE TESTING OF GLASS EPOXY POLARIS MOTOR CASES,
by John E. Abel. 1961, 13p. incl. illus. (NRL technical memo. no. 167)
(NRL proj. no. 62 R05 19A)
Unclassified report

Presented at the 18th Polaris/Minuteman/Pershing Nondestructive Test Committee Meeting, Salt Lake City, Utah, 2-3 Aug 61.

DESCRIPTORS: (*Rocket cases, Filament wound construction, Glass textiles, Fibers, Filaments, Plastics, Epoxy resins, Laminates, Absorption, Moisture, Detection, Test equipment, *Moisture meters, Non-destructive testing, Dielectric properties.) (Determination, Measurement, Guided missiles, Surface to surface, Underwater to surface.)

The laboratory model of the test instrument was mechanized to measure the dissipation factor of the dielectric (the motor case). The dissipation factor of the dielectric varies as a function of moisture content. The measurement method uses the Q of a very stable tuned circuit as a standard for comparison. A concentric probe is connected in parallel with the capacitor element of the tuned circuit. The sample to be investigated is placed on this probe and thus forms the dielectric portion of a capacitor. If the dissipation factor of this dielectric is changed by water absorption then the resultant Q of the tuned circuit will be lowered. (Author)

AD-266 001 Div. 27, 12, 14
(TIPTM/GEC) OTS price $1.60

Kidde, Walter, and Co., Inc., Belleville, N. J.
FIBERGLASS MOTOR CASE STUDY. POLARIS SECOND STAGE END CLOSURE.
Progress rept., 1-31 Oct 61,
by T. Siuta. 7 Nov 61, 5p. illus. tables (Rept. no. 3642-7)
(Contract NOw 61-0497-c)
Unclassified report

DESCRIPTORS: (Rocket motors, Rocket closure cups, *Rocket cases, Glass textiles, Filament wound construction, Design, Deflection, Hydrostatic pressure, Tests, Model tests.) (Guided missiles, Surface to surface.)

The hydrostatic deflection characteristics of dome closure contours of models of the Polaris second stage were investigated. The model KB-16 (wound over air inflated bladder) showed greater deflections than KB-15 (wound over a rigid plaster mandrel) especially in the polar fitting and knuckle area. The fitting contour did not meet zero shear contour requirements as did the KB-15 model. The contours exhibited by KB-15 were considered more representative. Results were compared graphically with tests conducted on full scale cases; no conclusions were made. Forward domes exhibited greater deflections than aft domes probably because of the large metal dish in the aft dome restricting axial growth. Recommendations were made that the built up area on the dome contour be eliminated, that forward and aft domes be identical in size, and that additional instrumentation for deflection and bending strain be utilized in further experimentations.

AD-266 053 Div. 27, 17, 26, 12
(TIPTM/SEB) OTS price $8.60

Mellon Inst. of Industrial Research, Pittsburgh, Pa.
EVOLUTION OF ULTRA-HIGH STRENGTH STEELS, AND RESEARCH ON MATERIALS AND VARIOUS NOVEL TECHNIQUES OF FABRICATION OF HIGH PERFORMANCE ROCKET MOTOR CASES.
Final rept.,
by B. K. Bhat. Oct 61, 81p. incl. illus. tables.
(Contract NOrd-18169)
Unclassified report

DESCRIPTORS: (*Rocket cases, *Steel, Physical properties, Mechanical properties, Stresses, Tensile properties, Machining, Manufacturing

methods, Heat treatment, Ultrasonics, Corrosion, Microstructure, Welding.) (Wires, Aluminum alloys, Beryllium, *Aluminum wire, Drawing (Machine processing), Filament wound construction, Processing.)

Data are given for a newly developed low-alloy ultrahigh-strength steel Rocoloy 270. This steel is capable of achieving yield strength around 270 Ksi and ultimate tensile strength minimum of 310 Ksi in conjunction with other necessary engineering properties. Data are obtained of the notch tensile strength, biaxial strength, impact strength, elevated temperature strength, and stress-rupture characteristics and also fatigue properties to demonstrate the suitability of Rocoloy 270 for the manufacture of high performance rocket motor cases and as structural material in designs specifying lightweight, high-strength components. Fabrication characteristics are discussed and compared with other similar steels which include observations on various forming and welding aspects of Rocoloy 270. Experiments were conducted to demonstrate weld grain refinement possibilities with the aid of continuously applied ultrasonic energy to the solidifying weld bead. (Author)

28. PSYCHOLOGY AND HUMAN ENGINEERING

AD-265 556 Div. 28
(TIPTB/MS) OTS price $6.60

Kansas State U., Manhattan.
THE EVOLUTION OF PERCEPTUAL FRAMES OF REFERENCE.
Sep 61, 70p. incl. illus. table, 97 refs.
(Repts. no. 1-4)
(Contract Nonr-329001, Proj. NR 142-155)
Unclassified report

DESCRIPTORS: (*Adjustment (Psychology), *Perception.)

THE CONCEPT OF ADAPTATION IN MODERN PSYCHOLOGY, by William Bevan. Sep 61, (Technical rept. no. 1)

THE NEWHALL SCALING METHOD, PSYCHOPHYSICAL BOWING, AND ADAPTATION LEVEL, by William Bevan, Harry Barker, and Joan Faye Pritchard. Sep 61, (Technical rept. no. 2)

SINGLE-STIMULUS JUDGMENTS OF LOUDNESS AS A FUNCTION OF PRESENTATION-INTERVAL, by William Bevan, Walter G. Reed, and Joan Faye Pritchard. Sep 61, (Technical rept. no. 3)

THE ANCHOR EFFECT AND THE PROBLEM OF RELEVANCE IN THE JUDGMENT OF SHAPE, by William Bevan and Joan Faye Pritchard. Sep 61, (Technical rept. no. 4)

AD-265 558 Div. 28, 23
(TIPTB/MS) OTS price $1.60

Naval School of Aviation Medicine, Pensacola, Fla.
APTITUDE AND PERFORMANCE DATA OF FLIGHT AND NAVAL AVIATION OFFICER STUDENTS BY PROCUREMENT SOURCE, by Rosalie K. Ambler. 29 Aug 61, 14p. incl. tables (Special rept. no. 61-9)
Unclassified report

DESCRIPTORS: (*Aptitude tests, Naval personnel, Selection, Flight, Training.)

The purpose of this report is to provide reference data concerning differences in student quality among the various procurement sources for the flight and Naval Aviation Officer (NAO) programs. Based upon a composite ranking of aptitude, performance, and attrition, the flight students procured from USN/NROTC, the Naval Academy, USCG, and USMC sources were superior. Those flight students procured from USNR/DP, USMCR, MarCad, and AOC sources were poorest with respect to their composite ranking. The AOC type NAO students surpassed OI type NAO students in average pre-flight performance; however, the OI NAO's were superior to the AOC NAO's in average NAO Basic School performance. In the areas of pre-flight performance and pre-flight attrition where comparisons between NAO and flight students were possible, the flight students were generally superior to NAO's. MarCads, AOC flight students, and AOC NAO students had excessively high medical failure rates. (Author)

AD-265 607 Div. 28, 30
(TIPTB/MS) OTS price $.50

Behavioral Sciences Lab., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
AN APPLICATION OF A DYNAMIC PILOT-MODEL TO SYSTEM DESIGN.
Rept. on Human Performance in Advanced Systems, by George G. Frost. Apr 61, 9p. incl. illus. table.
(Proj. no. 7184)
(ASD TN 61-57) Unclassified report

DESCRIPTORS: (*Human engineering, Control systems, *Display systems, Design, Aircraft, Flight simulators, Re-entry vehicles, Analog computers.)

Design, evaluation, and integration of controls and displays for advanced flight vehicles present recurrent problems for the human engineer. This report presents a method for solving these on a fast-time analog computer and describes one application. The basic concept of this approach centers about the use of a dynamic model of the pilot which can be instrumented on the computer along with the airframe and flight control dynamics, thus permitting design and evaluation of the total closed loop system during the early design phase. (Author)

AD-265 861 Div. 28, 5
(TIPTB/MS) OTS price $8.10

HRB-Singer, Inc., State College, Pa.
HUMAN ENGINEERING ANALYSIS OF THE AUGMENTED FOUR-WHEELS SYSTEM,
by Stephen H. Gates, George Grant, and Roger B. King. 1 Oct 61, 89p. incl. illus. (Scientific rept. no. 1)
(Contract AF 19(604)7990)
(AFCRL-944)
Unclassified report

DESCRIPTORS: (*Human engineering, *Radio stations, *Radar stations, Maintenance, Hazards, Safety, Tests.) (*Shelters for Airport control towers, Communication equipment,

Communication systems, Search radar, Ground controlled approach radar, Telephone communication systems, Control systems, Control panels, Design.)

This report is a description of the human engineering aspects of the Precision Approach Radar (PAR), Surveillance Approach Radar (SAR), Communications, and VFR Tower shelters of the Augmented 4 Wheels System. It describes the layout, eqipment configurations, operational functions and ambient conditions for each of these shelters. The final section outlines human engineering recommendations for common aspects of the system. (Author)

AD-265 884 Div. 28 23
(TIPTB/CCH) OTS price $13.50

Dunlap and Associates, Inc., Stamford, Conn.
AN ANALYSIS OF THE MAINTENANCE SUPPORT SYSTEM,
by Joseph G. Wohl, H. Richard Kropp and others.
Aug 61, 185p. incl. illus. tables, 39 refs.
(Contract N61339-502)
(NAVTRADEVCEN 502-1) Unclassified report

DESCRIPTORS: (*Maintenance, *Training devices, Navy.) (Ground support equipment, Analysis, Test facilities, Economics, Costs, Mathematical analysis.) (*Human engineering, *Reliability, Maintenance personnel, Training.)

This is a study of the various factors associated with maintenance of Naval training devices. The basic processes are first described. Significant variables are then identified and defined; their interrelationships are developed; and the effects of selected maintenance decisions, via the relationships, upon lost training hours are traced. The costs associated with each decision are also identified, and decision rules are developed to aid in determining the effects of selected maintenance decisions upon cost and upon lost training. Information gathered from field interviews, questionnaires, maintenance logs, and data files is used in the development of the relationships. Several examples are presented to indicate how the study results can be used. Finally, specific recommendations are made, based upon both the experience gained during the study and the results obtained, concerning methods for reducing lost training hours at least cost. (Author)

AD-265 998 Div. 28
(TIPTB/CCH) OTS price $4.60

Delaware U., Newark.
EFFECTS OF N AFFILIATION, SEX, AND THE SIGHT OF OTHERS UPON INITIAL COMMUNICATIONS IN PROBLEM-SOLVING GROUPS,
by Ralph V. Exline. 1 Nov 61, 44p. incl. tables (Technical rept. no. 4)
(Contract Nonr-228502)
Unclassified report

DESCRIPTORS: (*Sociometrics, Group dynamics, Stimulation, *Social communication, Adjustment (Psychology), Behavior, Test methods, Effectiveness, Sex, Vision, Visibility.)

The results were (a) Women's messages were significantly more person-oriented than were men's. (b) In women's relative to men's groups Ss whose co-workers were visible requested significantly more personal information than did those whose co-workers were non-visible. (c) n affiliation was significantly and inversely related to the degree of control over others' behavior attempted in the first message written in the process of group problem-solving. There was no evidence that n affiliation per se affected the degree of person relative to task-oriented communications, nor did n affiliation combine with visibility to produce effects upon either person-relevant or control-relevant communications. It was concluded that earlier findings concerning sex effects upon person-orientation are reproducible and that n affiliation effects upon decision procedures reflected weaker expressions of control by those high in n affiliation. Results were discussed in terms of a paradigm of group task requirements proposed by Roby and Lanzetta. Methodological implications of the use of scaling procedures to reduce the effort, and increase the reliability and validity of message analyses were discussed. (Author)

29. QUARTERMASTER EQUIPMENT AND SUPPLIES

AD-265 521 Div. 29, 16
(TIPTB/MS) OTS price $1.60

Army Medical Research and Nutrition Lab., Denver, Colo.
A STUDY OF THE DIGESTIBILITY AND ACCEPTABILITY OF A NEW DEHYDRATED RATION,
by William T. Nunes, Richard C. Powell and others. 12 June 61, 14p. incl. illus. tables.
(Rept. no. 258)
Unclassified report

DESCRIPTORS: (*Military rations, Food, Dehydrated substances, Acceptability, Tests.)

A new dehydrated field ration was fed to 9 normal human subjects and compared with a similar diet consisting of fresh foods. The new field ration was digestible and was well accepted by the test subjects. It is felt that the new ration will prove useful and merits further evaluation under actual field conditions. (Author)

AD-265 791 Div. 29, 20
(TIPTB/JAB) OTS price $1.60

Visking Co., Chicago, Ill.
DEVELOPMENT OF RADIATION PRESERVED HAM.
Rept. no. 2 (Final), 1 Nov 59-31 Oct 60,
by F. Warren Tauber. 31 Oct 60, 13p. incl. tables.
(Proj. no. 7-84-01-002)
Unclassified report

DESCRIPTORS: (*Food, Pork, *Radiation effects, Preservation, Salts.)

Hams in the 16 to 18 pound weight range were pumped with pickle to 10% of the green ham weight. After pumping, the hams were cured for one week in cover pickle. A basic cure containing only salt and nitrite was used for pumping and cover pickle. Either nitrate, phosphate, dextrose or ascorbate were added separately to the pumping pickle in order to determine the influence to each component on the quality of radiated ham. (Author)

Division 29-QUARTERMASTER EQUIPMENT AND SUPPLIES

AD-265 844 Div. 29, 17, 20
(TIPTB/CW) OTS price $1.60

Continental Can Co., Inc., Chicago, Ill.
THE DETERMINATION OF THE SUITABILITY OF ALUMINUM CONTAINERS FOR THE PACKAGING OF IRRADIATED FOODS.
Rept. no. 6 (Final), 29 Nov 58-28 July 61,
by A. G. Skibbe. 28 July 61, 11p. incl. tables.
(Contract DA 19-129-qm-1327, Proj. 7-84-01-002)
Unclassified report

DESCRIPTORS: (*Food, Preservation, *Containers, *Aluminum, Packaging, Radiation effects, Enamel coatings, Acceptability.)

Five different food products, whole kernel corn, green beans, phosphate cured ham, tuna chunks, and peaches, have been packed in aluminum and tinplate cans, irradiated to a dosage level of 5.0 megarads, and stored for one year at 77 and 100 F. Samples from the same lots of cans were thermal processed as controls. All enameled aluminum containers performed satisfactorily with corn, green beans, ham, tuna, and peaches when irradiated or thermal processed. The irradiation treatment appeared to have less effect on the enamels as measured by a lesser amount of darkening and staining and fewer micro-blisters as compared to the thermal process treatment. Plain aluminum containers performed satisfactorily with corn but unsatisfactorily with green beans, tuna, ham and peaches when processed either by irradiation or thermal treatment, due to excessive corrosion and staining of the plate. The tinplate variables performed satisfactorily for peaches, corn, tuna and green beans when irradiated or thermal processed. In the case of ham packed in enameled tinplate cans, the irradiated samples were satisfactory while the thermal processed cans showed some loss of enamel adhesion peeling, blisters and corrosion at the drawn corners of the cans. The product appearance varied from product to product in comparing irradiated samples with thermal processed samples. Corn, green beans and peaches were darker when irradiated as compared to the thermal processed products, while the reverse was true for ham and tuna. (Author)

AD-265 845 Div. 29, 20
(TIPTB/CW) OTS price $1.10

California U., Davis.
RADIATION PRESERVATION OF FRESH STRAWBERRIES AND GRAPES.
Rept. no. 3 (Final), 5 Mar 59-5 Mar 61, on Physiological Effects of Ionizing Radiation on Some Deciduous Fruits,
by Roger J. Romani, E. C. Maxie, and Betty J. Robinson. 5 Mar 61, 4p.
(Sponsored by Quartermaster Food and Container Inst. for the Armed Forces)
Unclassified report

DESCRIPTORS: (*Fruits, Preservation, Beta particles, Gamma rays, Radiation effects, Biochemistry.)

Irradiation studies with pears were continued with the following objectives: (1) determination of the respiration of individual fruit; (2) comparison of beta and gamma irradiation; and (3) preparation of samples for biochemical investigation. The post-irradiation respiration of single fruit was similar to that of batch samples but more useful in selecting individual fruit at given physiological states. Beta and gamma radiation produced similar gross physiological effects including prolongation of ripening. Methods have been devised and preparation made of both enzyme extracts and lyophillized material for further biochemical study. (Author)

AD-265 897 Div. 29
(TIPTB/CCH) OTS price $3.60

Marine Corps Development Center, Quantico, Va.
HEATERS CATALYTIC, FLAMELESS, COMBUSTION.
Final rept.
7 Nov 61, 21p. incl. illus.
(Proj. 42-60-03)
Unclassified report

DESCRIPTORS: (*Heaters, Catalysis, Combustion, Military equipment, Naval equipment, Marine Corps.)

Heaters Catalytic, Flameless, Combustion were service tested by ground and aviation units to determine their suitability for Marine Corps use as an inexpensive, compact, light weight, portable source of heat for individual Marines, to increase finger dexterity of personnel performing maintenance, provide heat for the individual or small groups of Marines in the field, as well as for heating individual rations. In addition tests were conducted by the U. S. Naval Research Laboratory. The heaters did not operate with fuels normally available in the field; the BTU output was too low to have significant beneficial effect in cold weather; the units were difficult to start operating; and over-all were considered unreliable. Based on the results of the test the catalytic heaters tested were not satisfactory for the intended use. Accordingly, they are not recommended and the project should be terminated. (Author)

AD-265 924 Div. 29, 20, 16
(TIPTB/GW) OTS price $1.10

Nestle Co., Inc., White Plains, N. Y.
RADIATION STERILIZATION OF COCOA POWDERS.
Rept. no. 5 (Final), 17 Feb 59-16 Feb 61 on Radiation Preservation of Chocolate Products,
by M. E. DeBenedictis and J. V. Feminella.
16 Feb 61, 7p. tables.
(Sponsored by Quartermaster Food and Container Inst. for the Armed Forces)
Unclassified report

DESCRIPTORS: (*Beverage powders, *Food, Pasteurization, Preservation, Gamma rays, *Radiation effects, Acceptability.)

Five experiments were conducted and all findings, notes, data and conclusions for this period were consolidated. The experiments included radiation treatment on chocolate coatings, cocoa, and chocolate syrup. In all experimentation with gamma radiation, FLAVOR is the critical problem. At dosage levels which produce satisfactory results for controlling microorganisms and certain quality properties, off-flavors develop. It is shown that products of high fat content usually show marked changes in flavor. For example: cocoas, milk and bittersweet coatings, and cocoa butter. Inversely, no off-flavors were detectable in chocolate syrups which have a low fat content. Some resistance to bloom can be achieved but at the loss of other important physical characteristics. In the case of cocoa butter, this is appearance. The acceptability of irradiated foods by humans must yet be demonstrated and considerable work is required before positive conclusions can be obtained. (Author)

30. RESEARCH AND RESEARCH EQUIPMENT

AD-265 506 Div. 30
(TIPTB/MS) OTS price $.75

Watertown Arsenal Labs., Mass.
A MEDIUM-SPEED TENSILE TESTING MACHINE.
Rept. on Research of Metals and Nonmetallic Materials for Ordnance Construction,
by A. G. H. Andersen. Sep 61, 23p. incl. illus. table (Technical rept. no. WAL TR 020/14)
Unclassified report

DESCRIPTORS: (*Tensiometers, Design, Tests.)

A gas-driven tensile tester, recently designed and built at Watertown Arsenal Laboratories, has a load capacity of 15,000 pounds and an idling speed of 300 in./sec. over a 3-inch stroke, at 500 psi nitrogen, half the allowable maximum pressure. Loads and strains may be recorded by oscillographs or oscilloscopes. The scope can be triggered through an electric circuit by an internal automatic poppet valve in the main gas port. External auxiliary diaphragm valves are actuated by solenoids. The machine is mounted on a carriage resting on springs and Barrymounts so that operation at full load transmits negligible vibrations to the floor. Weight of machine and carriage is 700 pounds; base, 600 pounds; and steel safety cabinet, 400 pounds. (Author)

AD-265 614 Div. 30, 27, 10
(TIPTM/SEB) OTS price $1.25

Olin Mathieson Chemical Corp., New Haven, Conn.
AMPEROMETRIC PROPELLANT-COMPONENT DETECTOR.
Rept. for May 60-Dec 60 on Health Hazards of Materials and Radiation,
by Nicholas A. Poulos. May 61, 39p. incl. illus. tables, 19 refs.
(Contract AF 33(600)39311, Proj. 7165)
(ASD TR 61-154) Unclassified report

DESCRIPTORS: (*Exhaust gases, Measurement, *Gas detectors, Design, Tests.) (Nitrogen compounds, Tetroxides.) (Hydrogen compounds, Fluorides.) (Ozone, Hydrazines, Methyl hydrazines.) Rocket propellants.

The data obtained in production of an improved multipurpose detector capable of measuring low airborne concentrations of N_2O_4, O_3, N_2H_4, unsymmetrical dimethylhydrazine (UDMH), and HF is presented. The concept of forward and reverse polarization was applied and considerable specificity was obtained for oxidizing and reducing substances. Sensitivities were obtained of 100 microamperes/ppm of N_2O_4, 52 microamperes/ppm of O_3, 40 microamperes/ppm of H_2N_2, and 20 microamperes/ppm of UDMH. The Amperometric Propellant-Component Detector features self-powered and/or line operation, a built-in rectifier system, a split air-flow system to reduce baseline shift, and a charcoal-sample air by-pass to give the best system for zero checking. The instrument has an effective current gain of 35, and has an input resistance of 10 K ohms. The instrument was provided with a range switch of X 100, X 10, and X 1. Resistor values for providing X 20, X 10, X 5, X 2, and X 1 operation were obtained by actual shunt substitution. (Author)

AD-265 654 Div. 30, 32
(TIPTB/CCH) OTS price $5.60

Texas U., Austin.
MACHINE LANGUAGE TRANSLATION STUDY.
Quarterly progress rept. no. 9, 1 May-31 July 61, by E. D. Pendergraft. 31 July 61, 55p.
(Contract DA 36-039-sc-78911)
Unclassified report

DESCRIPTORS: (*Language, *Machine translation, Theory.) (Mathematical computer data, Programming, Test methods, Tests, Mathematical analysis.)

The developmental status of a generalized computer system for language translation is explained. A formal definition of synonymy in the mathematical model underlying the system and the function of synonymy in the translation algorithm are discussed. Methods are also described by which automatic programming techniques will use interlingual symbols to organize input and output grammars for the generalized translation algorithm. The system is 'generalized' in the sense that specific languages are not presupposed by the algorithm; it will be capable of translating a wide variety of artificial and natural languages. (Author)

AD-265 660 Div. 30, 26
(TIPTM/EJH) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
DEVICE FOR WORKING LIQUID METAL,
by V. T. Burtsev, A. M. Samarin and others.
3 Oct 61, 3p. incl. illus. (Trans. no. MCL-965 of Byulletin' Izobreteniy 13:pp. 49, 1960)
Unclassified report

DESCRIPTORS: (*Liquid metals, Processing, Laboratory equipment, Design, *Vacuum apparatus, Pumps, Sprays.) (USSR, Translations, Technological intelligence.)

A device for working liquid metal, made in the form of a vacuum chamber with two vertical channels, through which the metal is pumped with the aid of an induction pump is described. For the purpose of increasing the free surface of the metal being worked by spraying it in a stream, the length of the channels is made greater than the height of the raised column of metal as a result of the difference between the atmospheric pressure and the pressure in the chamber. Thus after the induction pump is switched on, the metal can be poured from one channel into the other across the threshold of the vacuum chamber. (Author)

AD-265 682 Div. 30, 1
(TIPTB/CCH) OTS price $6.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
MANUAL ON LOADING AND LOAD CENTERING OF CIVIL AIR FLEET AIRCRAFT WITH GAS TURBINE ENGINES
(Rukovodstvo po Zagruzke i Tsentrovice Samoletovgvf Sgazoturbinnymi Dvigatelyami)
by P. Zhigarev. 13 Sep 61, 63p. incl. illus. tables (Trans. no. MCL-1107 of Glavnoye Upravleniye Grazhdanskogo Vozduzhnogo Flota Pri Sovete Ministrov SSSR: 61p., 1958)
Unclassified report

DESCRIPTORS: (*Instruction manuals on *Loading in Aircraft, *Commercial planes with *Transport planes.) (USSR, Translations, Air transportation.) (*Cargo, Handling.)

Division 30-RESEARCH AND RESEARCH EQUIPMENT

AD-265 686 Div. 30, 26, 17
(TIPTM/REB) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
A DEVICE FOR MEASURING THE TEMPERATURE AND SAMPLING MOLTEN METAL,
by V. A. Mikhaylov, L. M. Zmushko, and A. G. Lazarev. 6 Oct 61, 4p. incl. illus.
(Trans. no. MCL-1113 of Byulleten' Izobreteniy 15:pp. 59, 1960)

Unclassified report

DESCRIPTORS: (Slags, Melting, Metals, Sampling, *Quality control, Temperature, Measurement, Test equipment.) *Instrumentation.

To simultaneously measure the temperature and withdraw metal samples at the same point, a device is proposed which is made in the form of a lined pipe, on which graphite sampler blocks and blocks for thermocouples are installed in pairs at various levels along its height. Electrical contacts are installed in the samplers, which send a signal when filled with molten metal. The signal wires from the samplers and the thermocouples are installed in shielded pipes, distributed about the circumference of the main pipe of the device. The samplers and thermocouple blocks with shield pipes are secured to connecting elbows by sleeve nuts. (Author)

AD-265 696 Div. 30, 8
(TIPTM/EJH) OTS price $1.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
ONE METHOD OF USING TOROIDAL CORES MADE OF FERROMAGNETIC MATERIALS TO CONVERT CONTINUOUS INTO DISCRETE VALUES,
by Yu. A. Belyayev. 19 Sep 61, 10p. incl. illus.
(Trans. no. MCL-1231 of Izvestiya Vysshikh Uchebnykh Zavedeniy, Elektromekhanika 12:26-31, 1960)

Unclassified report

DESCRIPTORS: (*Analog-to-digital converters, *Ferrite cores, Data processing systems, Circuits, Design, Materials, Feasibility studies.) Ferromagnetic materials, USSR, Technological intelligence, Translations.

The possibility of the operation of ferromagnetic toroidal cores as elements converting a varying continuous current value into discrete form is discussed. The testing of the pulse characteristics of 3 types of cores showed K-222 cores possess the best properties. Two structural circuits for converters using parallel and series data output are suggested. To demonstrate the practical convenience of cores made of ferromagnetic materials as converter elements an experimental unit with parallel output of the output data was assembled. This unit recorded 33 values of a continuous current varying with a frequency up to 1 cps and ranging from 0 to 1 amp in the form of a binary code. The structural circuits considered were relatively simple and were based on ferromagnetic materials which did not possess high-grade pulse characteristics. Use of materials with better characteristics (textured ferromagnetic alloys in the form of thin ribbon) and the production of new structural circuits may produce effective continuous discrete value. (Author)

AD-265 712 Div. 30, 25
(TIPTW/RD) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
A DEVICE FOR THE MEASUREMENT AND AUTOMATIC RECORDING OF THE RADIATION BALANCE,
by N. V. Bukhman. 3 Oct 61, 2p. incl. illus.
(Trans. no. MCL-1306 from Byulleten' Izobrenteniy 7, 1960)

Unclassified report

DESCRIPTORS: (Technological intelligence, USSR, Translations.) (Earth, Surfaces, *Thermal radiation, Measurement, *Recording devices, Automatic, Radio transmitters, Atmosphere.) (Heat transfer, Measurement, Heating elements.)

A device is described for measuring and automatically recording the radiation balance between the earth's surface and the atmosphere. It contains a two-way transmitter and an instrument for recording the electric signals which are proportional to the duration of the radiation value. It has the distinguishing feature that, in order to determine only the longwave radiation of the earth's surface and the atmosphere, its transmitter is encased in a glass shell and has two electric heating elements to compensate for the difference in temperatures of the upper and lower halves of the transmitter. (Author)

AD-265 715 Div. 30
(TIPTE/RD) OTS price $1.10

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
A SHAFT-ANGLE-TO-DIGIT CONVERTER,
by G. P. Gorobchuk. 3 Oct 61, 3p. incl. illus.
(Trans. no. MCL-1309 from Byulleten' Izobreteniy 12, 1960)

Unclassified report

DESCRIPTORS: (Technological intelligence, USSR, Translations.) (*Analog to digital converters, Design.) (*Disk recording systems, Disks, Materials, Radioactive Isotopes.)

A shaft-angle-to-digit converter is described. It contains a disk with code cells and reading elements, differing in that, for the purpose of simplifying the design, decreasing the dimensions, and increasing the reliability, the code cells of the disk are filled with a paste containing a radioactive isotope, while the reading elements are made in the form of metal plates connected to the inputs of amplifiers or crystal counters. (Author)

AD-265 773 Div. 30, 20
(TIPTW/DLW) OTS price $3.60

Naval Research Lab., Washington, D. C.
RADIATION EFFECTS: APPARATUS FOR IN-PILE ELECTRICAL MEASUREMENTS AND EFFECT OF RADIATION UPON STRAIN GAGE INSULATION COMPONENTS,
by N. J. Rendler. 2 Oct 61, 30p. incl. illus. tables (NRL rept. no. 5674)

Unclassified report

DESCRIPTORS: (*Strain gages, Ceramic materials, Insulating materials, Lead, Wire, Radiation effects, *Radiation damage, Electrical properties, Resistance, Tests, Test equipment.) (*Test facilities, Laboratory equipment, Radiation instruments, *Nuclear physics laboratories, Design.)

Test facilities were developed for a series of in-pile experiments to be inserted in the reactor core immediately adjacent to the fuel element assembly of the NRL pool-type reactor. The apparatus design includes provision for in-pile electrical measurements, in-pool assembly and disassembly of experiments, temporary storage in the pool and transfer capability for post-irradiation operations in the hot cell. The program of study of the effects of nuclear irradiation upon the components of the ceramic bonded strain gage was continued with evaluation of the electrical resistance of lead wire insulation. The insulation resistance between electrical conductors was maintained at values greater than 10,000 megohms during an exposure to an integrated fast neutron flux. The high values of resistance were obtained with a ceramic-type wire insulation tested in an inert atmosphere of dry helium. (Author)

AD-265 788 Div. 30, 5
(TIPTE/CRJ) OTS price $2.60

Aeronautical Electronic and Electrical Lab., Naval Air Development Center, Johnsville, Pa.
DEVELOPMENT OF A TRANSISTORIZED RANGE COMPUTER FOR THE 1/4-NAUTICAL-MILE COMRAZ SYSTEM,
Final rept.,
by E. Kee. 10 July 61, 22p. incl. illus. (Rept. no. NADC-EL-6119)
(WEPTASK no. RAC 32J-001/2021/F002-13-004)
Unclassified report

DESCRIPTORS: (*Radio communication systems, *Transmitter-receivers, *Military communications, *Computers, Airborne, Design.) (*Computers, Transistors, Range, Measurement, Determination.) (*Range finding, Radio equipment, Electronic circuits.)

The COMRAZ range computer was developed to increase the functional utility of existing and future military communications by providing a range determining feature. Two identical experimental COMRAZ range units were constructed for demonstration purposes. All circuits were transistorized and constructed as plug-in modules. Each model consisted of a main chassis with 14 modules and a built-in regulated power supply; a multiple drum-type indicator to display the range in nautical miles on separate tumblers in increments of hundreds, tens, units, and quarters of a nautical mile; and an electro-mechanical coupler that translates range information from the main chassis into digital readouts on the indicator. The laboratory tests performed on the experimental range units indicated that a complete transistorized version of the COMRAZ range computer was feasible. (Author)

AD-265 800 Div. 30, 25
(TIPTP/WH) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ERRORS IN THE MEASUREMENT OF TRANSIENT SURFACE TEMPERATURES,
by N. A. Yaryshev and A. S. Makhnovetskiy.
23 Oct 61, 19p. incl. illus. (Trans. no. FTD-TT-61-35 of Izvestiya Vysshikh Uchebnykh Zavedeniy, Priborostroyeniye 3:100-110, 1960)
Unclassified report

DESCRIPTORS: (Translations, USSR.) (*Heat transfer, Temperature, Measurement, Thermometers, *Thermocouples, Errors.)

Small thermocouples and resistance thermometers are usually used to measure the transient surface temperatures from contact heat receivers. The problem of estimating the measurement errors and selecting the required heat receiver arises when designing the surface temperature gages and processing the measurement data. Errors arising in measuring the transient surface temperatures of walls using resistance thermometers are analyzed. Equations are obtained for calculating the errors as a function of the heat-exchange conditions and the thermophysical properties of the gage and the wall. (Author)

AD-265 831 Div. 30
(TIPTE/DLW) OTS price $14.50

Aeronutronic, Newport Beach, Calif.
COMPUTER SET, ELECTRONIC ORDER-OF-BATTLE AN/GSQ-38 (XW-1).
Technical rept. on Electronics Operations.
1 Sep 61, 212p. incl. illus. tables (Publication no. U-1368)
(Contract AF 30(602)2020)
(RADC TR 61-234) Unclassified report

DESCRIPTORS: (Computers, Magnetic tape, Memory devices, *Data processing systems, *Data storage systems, *Digital computers, Computer logic, Programming, Mathematical computer data, Circuits, Printing, Effectiveness, *Digital systems.)

A unique digital system for searching and retrieving information which meets a predetermined set of requirements from magnetic type files is described. The file organization and inquiry formulation are discussed and developed. A technique for evaluating criteria statements expressed in Boolean algebra form is also derived. A special-purpose digital computer using BIAX logic elements is employed to perform high-speed comparisons and evaluation at full magnetic tape speeds. The internal organization of the units is discussed. A sample search of a personnel file was formulated including a discussion of the record format and the preparation of an inquiry statement. Extensions of the systems applications are suggested. (Author)

AD-265 836 Div. 30, 8
(TIPTW/DLW) OTS price $7.60

Armour Research Foundation, Chicago, Ill.
INSTRUMENTATION AND MEASUREMENT TECHNIQUES STUDY.
Quarterly rept. no. 10, 1 May-31 July 61,
by A. T. Ashby. 31 July 61, 70p. incl. illus.
(Rept. no. ARF 5112-30)
(Contract DA 36-039-sc-78269, Proj. 3G89-01-021-01)
Unclassified report

DESCRIPTORS: (*Test sets, Test equipment, Military equipment, Instrumentation, Measurement, Correlation techniques.) (*Electronic circuits, Printed circuits, *Recording devices, Heat resistant polymers, Electrostatics, Magnetic recording systems, Electron beams, *Telephone cables, Field wire communication systems, Test methods.) (Impedance, Modulation, Phase distortion, Sidebands, Semiconductors, Test equipment.)

Work was continued in several areas of investigation intended to advance the state of the art of electrical measurements. A square wave technique for isolating faulty components in conventionally-wired or printed circuitry without

the need of unsoldering was implemented and is described. A modified sawtooth signal shows promise of isolating faulty semiconductor devices in-the-circuit. A survey of recording and readout techniques other than the normally employed magnetic devices is presented. This discussion outlines the problem areas in thermoplastic recording Kerr magneto-optic and electron beam readout devices. Techniques for locating faults in long-line spiral-four systems are discussed. Two correlation techniques are discussed, and a breadboard impedance-phase angle measuring device is described. An investigation of the properties of spiral-four cable is also described. (Author)

AD-265 941 Div. 30, 9
(TIPTW/WAW) OTS price $11.00

Princeton U., N. J.
A NEW FACILITY FOR THE STUDY OF AIRCRAFT DYNAMICS,
by E. Martinez. July 61, 144p. incl. illus.
(Rept. no. 532)
(Contract DA 44-177-tc-524)
Unclassified report

DESCRIPTORS: (*Vertical take-off planes, *Helicopters, *Test facilities for Model tests, *Flying platforms.) (Test facilities, Design, Instrumentation, Operation, Servomechanisms.) (Airplane models, Design.) (Stability, Measurement.)

The first of the author's two purposes was to acquaint the helicopter and vertical-take-off-and-landing engineer and designer with the use of this new model flight facility as an effective and practical tool to economically evaluate, modify, and perfect his designs. The second is to present the design philosophy and the experience accumulated during its development to provide the basis on which other, perhaps more sophisticated facilities of this nature can be designed and constructed. The physical plant and equipment are described in detail. A discussion on the design of the horizontal and vertical servomechanisms is presented. The design and construction of the models used in the facility are discussed briefly. Operating techniques used in the testing of a helicopter model, a vertical takeoff aircraft model, and a ground effect machine model are discussed and typical samples of the data obtained are included. A large number of photographs give a complete graphical description of the apparatus. The preliminary information available from the facility has shown this new technique and apparatus to be highly effective in obtaining direct quantitative data on the dynamic stability of flying or proposed designs for helicopters, vertical or short takeoff craft. (Author)

AD-265 988 Div. 30
(TIPTP/MFA) OTS price $1.60

Columbia Radiation Lab., Columbia U., New York.
ALKALI-METAL OPTICAL MASERS,
by I. D. Abella and H. Z. Cummins. 1 Nov 61, 11p. incl. illus. (Rept. no. 13-36-J; CU-1-61-AF-507)
(Contract AF 49(638)507)
(AFOSR-1465) Unclassified report

DESCRIPTORS: (*Masers, Optical equipment, *Alkali metals, Infrared radiation, Light, Mercury lamps, Fluorescence, Doppler systems, Interferometers, Mirrors, Hyperfine structure.)

An optical maser device is described by which a pressure broadened mercury lamp provides the outside light source. The mercury line was observed at high resolution and was found to be self-reversed. An adsorption cell containing potassium-absorbed energy was found to be about half as intense as mercury. The apparatus was assembled such that the mercury lamp was focussed by means of an elliptical cylinder onto a closed cell containing vaporized potassium.

AD-265 994 Div. 30, 8, 25
(TIPTP/WH/JP) OTS price $3.60

Contronics, Boston, Mass.
DIGITAL PANEL METER.
Quarterly progress rept. for period ending 31 Oct 61.
31 Oct 61, 31p. incl. illus. tables.
(Contract NObsr-85462)
Unclassified report

DESCRIPTORS: (Design, *Meters, Shipborne, *Display systems, *Analog-to-digital converters, Electronic circuits, Solid state physics, Transistors, Diodes.) (Subminiature electronic equipment, Solids, Printed circuits.) Semiconductors.

The initial efforts to build a digital panel meter using the Contronics field effect device as the basic analog-to-digital conversion device is described. Some preliminary experimental investigations are described and paper designs are given for two possible forms of the device: a one-stage device in which the complete analog-to-digital conversion is carried out by a single field effect device, and a two stage device in which one decade of the conversion would be carried out by transistor circuits, and the other two decades by a single field effect device. (Author)

AD-266 006 Div. 30
(TIPTP/JDP) OTS price $1.60

Diamond Ordnance Fuze Labs., Washington, D. C.
FEEDBACK SHIFT REGISTER FOR USE IN A PROGRAMMER,
by G. W. Kinzelman and H. J. Rosenberg.
30 Oct 61, 18p. (Technical rept. no. 892)
(DOFL Proj. 46300)
Unclassified report

DESCRIPTORS: (Feedback, *Switching circuits, Digital computers, *Programming, Design, *Electronic circuit.)

The use of a feedback shift register for a programmer is discussed. The distribution of register words preferred for readout is indicated and a digital computer program for locating them is given. (Author)

31. SHIPS AND MARINE EQUIPMENT

No Entries

32. MISCELLANEOUS ARTS AND SCIENCES

AD-265 656 Div. 32, 30
(TIPTB/CCH) OTS price $2.60

Indiana U., Bloomington.
AUTOMATIC LANGUAGE ANALYSIS.
Quarterly rept. no. 6,
by F. W. Householder, Jr. and J. P. Thorne.
31 Oct 61, 27p.
(Contract AF 30(602)2185)
Unclassified report

DESCRIPTORS: (*Language, *Vocabulary, Coding, Programing, Dictionaries, Punch card method, Automatic, Data processing systems, *Digital computers.)

The primary aim of the study is the development of fully automatic routines for the reduction of complex sentences to their constituent simple sentences without loss of information-content. The project has as its secondary aim the construction of an artificial regular language with a simple propositional structure, suitable for machine-storage and logical manipulation. All programs are tested on the IBM 650 computer. Work was directed specifically along three lines, (1) the development of recognition procedures, (2) the development of procedures for syntactic analysis, and (3) the preliminary investigation of possible structures for a suitable official language. (Author)

AD-265 687 Div. 32
(TIPTB/CCH) OTS price $1.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
ON THE SCIENTIFIC SCENE - CONFERENCE ON PROBLEMS OF SCIENCE AND TECHNOLOGY HELD AT KHARKOV INSTITUTE OF AERONAUTICS,
by V. K. Zolotukhin. 19 Sep 61, 17p. (Trans. no. MCL-1155 of Izvestiya Vysshikh Uchebnykh Zavedeniy - Aviatsionnaya Tekhnika 4:161-165, 1959)
Unclassified report

DESCRIPTORS: (*Conferences on *Scientific research.) (Social science, Languages, Mathematics, Mechanics, Aircraft, Airplane engines, Metallurgy.) (USSR, Translations.)

AD-265 794 Div. 32,
(TIPTB/CCH) OTS price $1.60

Aerospace Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio.
OUR COOPERATION WITH THE CHINESE PEOPLE'S REPUBLIC,
by S. S. Mironov and A. I. Bendik. 15 Sep 1, 12p. (Trans. no. MCL-1408 of Tsvetnyye Metally 9:4-10, 1959)
Unclassified report

DESCRIPTORS: (*Social communications, Population, China.) (USSR, Translations.)

AD-266 033 Div. 32, 28
(TIPTB/CCH) OTS price $.50

Aerospace Medical Lab., Wright Air Development Div., Wright-Patterson Air Force Base, Ohio.
HUMAN PERFORMANCE AND THE WORK-REST SCHEDULE. Rept. on Training, and Psychological Stress Aspects of Bioastronautics,
by W. Dean Chiles and Oscar S. Adams. July 61, 6p.
(In cooperation with Lockheed Aircraft Corp., Marietta Ga.)
(ASD TR 61-270) Unclassified report

DESCRIPTORS: (*Labor, *Scheduling and *Job analysis, Effectiveness, Stress (Physiology).) (Space flight, *Fatigue (Physiology).) *Sleep.

This report contains a condensation of the material most relevant to the problem of work:rest scheduling in advanced aerospace systems. The major conclusions drawn are: (a) periods of wakefulness longer than 24 hours requiring performance of critical tasks are not feasible as a routine procedure; (b) 6 hours of sleep per day are adequate for most individuals; (c) sleep periods should not be less than 2 hours in duration; (d) continuous performance of monotonous tasks by themselves should not exceed 2 hours; (e) performance of active tasks may be extended to 10 hours; (f) total cycle duration (work plus rest) should be 4, 6, 8, or 12 hours in order to permit regular day to day schedules; (g) where stress will be high, schedules no more severe than 2-work:2-rest (or equivalent) should be used; (h) 7 or 8 days pretesting should be adequate to select persons adaptable to schedule changes; (i) a 5-day preadaptation period should be used to overcome initial sleep losses. (Author)

33. TRANSPORTATION

AD-265 645 Div. 33
(TIPTB/MS) OTS price $10.10

Federal Aviation Agency, Washington, D. C.
CHICAGO TRANSITION TERMINAL AREA AIR TRAFFIC SAMPLE IN SUPPORT OF THE CHICAGO POSITIVE CONTROL STUDY,
by Philip J. Steece. June 61, 101p. illus. tables.
Unclassified report

DESCRIPTORS: (*Air traffic, *Air traffic control systems, Analysis.)

This report contains an air traffic sample and analyses of the Chicago Transition Terminal Area. It was prepared in support of the Systems Engineering Division's task assignment to study the feasibility of low altitude positive control within a high density terminal area. One hundred and seventy-three airfields are located within a 100 nautical mile radius of the center point of the area under study. These airfields are estimated to contain about 4,200 general aviation and military active based aircraft. In addition, 866 daily scheduled air carrier flights through the area are expected. Nine hundred and fifty-two flights are estimated to occur during the busy two-hour sample period within the Chicago Transition Terminal Area. 68% of these flights are general aviation, 27% are air carrier, and 5% military. Two hundred and sixty-six flights are predicted to occur at the peak instant. Fifty-two percent of the total flights within the area under study are flown at altitudes below 5,000 feet, and 87% at altitudes below 10,000 ft. During the busy 2-hr period 25% are expected to be on IFR flight plans. (Author)

NON-MILITARY AND OLDER MILITARY RESEARCH REPORTS

* Descriptors marked with an asterisk will be included in the cumulative indexes.

ASTRONOMY

AD-260 742 $2.60

Harvard Coll. Observatory, Fort Davis, Tex.
THE DEVELOPMENT AND OPERATION OF A DYNAMIC SPECTRUM ANALYZER, by A. Maxwell and B. Bell. Final rept. 1 Apr 55-30 Mar 61, on Contract AF 19(604)1394. Apr 61, 25p. 29 refs. AFCRL-625.

DESCRIPTORS: *Solar atmosphere, *Solar disturbances, *Solar flares, *Solar noise, *Solar spectrum, Spectrographic analysis, Radio waves, Radio interference, *Radio astronomy, Measurement, *Sun, Radio receivers, Parabolic antennas, *Interferometers, Broadband, Solar corona, Statistical analysis, Magnetic storms, Aurorae, Sunspots, Ionospheric disturbances, *Radiofrequency spectrum analyzers.

Research was directed towards the study of radio burst emissions from the sun with a dynamic spectrum analyzer consisting of a series of sweep-frequency receivers. Included are: A brief description of the radio equipment at Fort Davis, together with its manner of operation; spectral observations of solar radio bursts; statistics of the various types of bursts, their association with flares and prominences, and their relation to emission of high energy particles from sun; a description of certain research programs at Harvard Observatory including statistical studies of sunspots and flare production, a study of solar line profiles, the structure of term spectra in isoelectronic sequences, non-laminar flow in the terrestrial ionosphere, and the relation of certain ionospheric parameters to solar activity.

PB 155 468 $1.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
AN S-BAND SWEEP-FREQUENCY RECEIVER, by David Keren. Rept. on Contract AF 19(604)7400. 17 Mar 61, 21p. 12 refs. Rept. 47G-0018; AD-253 619.

DESCRIPTORS: *Radio astronomy, *Microwaves, *Radio receivers, *Sun, *Solar energy, *Radio waves, *Radiofrequency power, Design, *Solar noise, *Solar disturbances, S-band, Solar atmosphere, Sources, Thermal radiation.

An S-band sweep-frequency receiver is described for use in the study of RF radiation from the sun. The receiver has the following characteristics: (1) 2 to 4 km frequency range: (2) continuously adjustable sweep dispersion from 1 to 2000 mc; (3) continuously adjustable sweep frequency from 10 to 0.01c; (4) adjustable bandwidth from 0.002 to 18 mc; and (5) noise figure below 5 db and 6 1/2 db from 2.4 - 3.6 kmc and 2-4 kmc respectively.

BEHAVIORAL SCIENCES

PB 155 116 $1.60

Adjutant General, Dept. of the Army, Washington, D. C.
PRELIMINARY EVALUATION OF MEASURES DESIGNED TO PREDICT ARMY REENLISTMENT, by W. H. Helme, L. J. Kotula, and D. J. Fitch. Dec 60, 15p. HFRB Technical research note 110; AD-252 339.

DESCRIPTORS: *Military personnel, Claffification, Personality tests, *Attitudes, Recruiting, Test methods, Statistical analysis.

To develop means of identifying enlisted personnel who are likely to reenlist in the Army, an experimental self-description instrument incorporating a number of personality and attitudinal variables was administered to enlisted samples. Two item-analysis keys were derived, one to maximize prediction of intention to reenlist expressed at entry into service, the other prediction of actual reenlistment. Both keys were found to be highly predictive of reenlistment in a cross-validation sample. Personality and attitude measures based on judgment keys also were promising predictors of reenlistment. Results reinforced the hypothesis that an attitudinal pattern associated with reenlistment action can be identified and that effective operational predictors of reenlistment can be developed. (Author)

PB 154 234 $8.10

Human Resources Research Office, George Washington U., Washington, D. C.
EXPERIMENTAL STUDIES OF SKILL IN COPYING INTERNATIONAL MORSE CODE, by S. James Goffard. Rept. on Contract DA 49-106-qm-1. Dec 60, 83p. 16 refs. HumRRO technical rept. 68; AD-249 915.

DESCRIPTORS: *Radio operators, *Cryptography, *Training, *Military training, *Military personnel, Learning, Coding, Effectiveness, Attention, *Radio teletype systems.

This research was directed at improving the motivation of students practicing international Morse Code. A new method of measuring skill at copying code was used in evaluating two experimental modifications of the program of practice material. Both modifications proved more interesting than the original program, but neither produced a significant increase in the rate of learning. A new program of progressive code practice is presented for use in code courses. It is believed that this practice system would be most advantageous in a course where the amount of time each student was required to spend in code instruction depended directly on the rate at which he learned code. (Author)

BIOLOGICAL SCIENCES

BNL-5541 $1.60

Brookhaven National Lab., Upton, N. Y.
KINETICS OF POPULATION OF BONE FORMING CELLS IN THE NORMAL AND IRRADIATED RAT, by N. F. Kember. Aug 61, 14p.

Anatomy and Physiology

AD 262 635 repriced $0.50

Aerospace Medical Lab., Wright Air Development Div., Wright-Patterson AFB, Ohio.
A TRANSISTORIZED HIGH QUALITY CARRIER AMPLIFIER FOR ELECTROCARDIOGRAM, by Adolf R. Marko. Rept. for July 59-Jan 60 on Biophysics of Flight. Mar 61, 12p. 3 refs. WADD Technical note 61-55.

DESCRIPTORS: *Electrocardiography, Electrical equipment, *Transistor amplifiers, Miniature electrical equipment, Design, Circuits, Cathode ray tubes, Amplifiers.

A miniaturized electrocardiogram transistor amplifier employing a high efficiency, low level modulator circuit has been developed. This amplifier combines the advantages of a carrier system with the low noise level and high input impedance of resistor-capacitance coupled straight amplifier. Circuit diagrams and operating characteristics are included. (Author)

PB 156 980 $1.60

Army Chemical Research and Development Labs., Army Chemical Center, Md.
TEMPERATURE REGULATION IN DECAUDATED RATS, by Charles G. Wilber and Paul F. Robinson. Mar 61, 12p. 8 refs. CRDLR-3063; AD-253 147.

DESCRIPTORS: *Body temperature, Physiology, *Heat tolerance, Temperature control, Rats, Oxygen consumption, Temperature.

Oxygen consumption was virtually the same for normal and decaudated rats at a given environmental temperature. In a chamber of 0 C, decaudated rats maintained a lower body temperature than normal rats. At an environmental temperature of 34 C, the colonic temperatures in both decaudated and normal rats showed similar changes. There is a suggestion that a holding-room temperature (about 23 C) decaudated rats maintain a lower body temperature than do normal rats. The data suggest that removal of the tails from rats imposes a generalized physiological insult on the animal. It is concluded that removal of the tails from presumably healthy rats does not modify temperature regulation in a significant manner. Decaudated rats may maintain a slightly lower body temperature than do normal rats. (Author)

PB 155 355 $1.10

Audiology Lab., Northwestern U., Evanston, Ill.
A NEW METHOD FOR THE CLINICAL DETERMINATION OF SENSORI-NEURAL ACUITY LEVEL, by James Jerger and Tom Tillman. Jan 60, 7p. 18 refs. AFSAM rept. no. 60-31; AD-232 650.

DESCRIPTORS: *Auditory acuity, Hearing, Measurement, *Audiometry, Test methods.

A new method for the clinical determination of sensori-neural hearing loss is proposed. Thermal noise of fixed intensity is presented to the skull through a standard bone-conduction oscillator mounted at the center of the forehead. The amount by which this noise shifts the puretone air-conduction threshold in a particular ear is subtracted from the shift produced by the same noise level in normal ears. The resulting number is called sensori-neural acuity level (SAL) in decibels. Preliminary exploration in 20 subjects with bilateral pure sensori-neural loss suggests that the new technic compares favorably with conventional bone-conduction audiometry in terms of both validity and accuracy. The new technic has two important advantages over conventional bone audiometry. First, the instrumentation can be calibrated with little difficulty. Second, the problem of cross-hearing to the nontest ear is greatly minimized. (Author)

Biochemistry

TID-13421 $1.60

THE EFFECT OF PARATHYROID HORMONE ON CARBOHYDRATE METABOLISM. Renewal proposal for support of research. [1961] 11p.

PB 155 118 $1.10

Naval Missile and Astronautics Center, Point Mugu, Calif.
STUDY OF STRUCTURAL AND FUNCTIONAL ASPECTS OF RIBOSOMES, by W. C. Gillchriest. 1 Mar 61, 2p. 3 refs. Technical memo. no. NMAC-TM-61-20; AD-252 064.

DESCRIPTORS: *Nucleic acids, *Viruses, *Peptides, Enzymes, *Biochemistry, Test methods, *Chemical analysis, Crystallization, Preparation, Biology, Structures, Cytochemistry, Microbiology, Ammonium radicals, Buffers.

A simple chemical method is discussed for the clarification of structural from functional components in ribosomes. The method, with future modifications, may prove to be a technique for the crystallization of ribosomes. (Author)

Pharmacology and Toxicology

PB 156 413 $1.60

Army Chemical Research and Development Labs., Army Chemical Center, Md.
SUMMARY OF INFORMATION ON 2-PAM-Cl, by J. H. Wills. Mar 61, 12p. CRDL Special pub. 2-38; AD-253 171.

DESCRIPTORS: *Chemical warfare agents, Safety, *Chemotherapeutic agents, Poisoning, Atropine, Cholinesterase, Effectiveness, Toxicity.

Information is summarized relating to the safety of 2-PAM-Cl for use by intravenous, intramuscular, and, possibly, oral administration as a component of therapy and prophylaxis of poisoning by anticholinesterase compounds, including CW agents of the nerve gas type. (Author)

PB 158 508 $21.00

Office of Scientific Research and Development. Div. 9.
CHEMICAL WARFARE AGENTS, AND RELATED CHEMICAL PROBLEMS. PARTS I-II. Summary technical rept. vol. 1 on Contract OEMsr-1131. 1946, downgraded 23 Apr 58, declassified 25 Mar 60, 390p. 6 refs. AD-234 270.

DESCRIPTORS: *Chemical warfare agents, Hydrogen compounds, Cyanides, Cyanogen chlorides, Phosgene, Sulfur compounds, Fluorides, Mustard gas, Sulfur mustards, Nitrogen mustards, Arsenides, Carbamates, Nitroso radicals, Phosphorus compounds, Fluorides, Phosphates, Methyl radicals, Acetates, Cadmium, Selenium, Iron compounds, Nickel compounds, Carbonyl radicals, Ricin, Toxicity, Poisonous gases, Heat, Casualties, Chemical warfare casualties, Preparation.
Contents:
Preparation and evaluation of potential chemical warfare agents: Resume of agent assessments; Hydrogen cyanide and cyanogen chloride; Phosgene; Disulfur decafluoride; Mustard gas and other sulfur mustards; Nitrogen mustards; Arsenicals; Aliphatic nitrosocarbamates and related compounds; Fluorophosphates and other phosphorus-containing compounds; Methyl fluoroacetate and related compounds; Cadmium, selenium, and the carbonyls of iron and nickel; Ricin; Aromatic carbamates; Miscellaneous compounds prepared or examined as candidate chemical warfare agents
Special physiological and toxicological studies: The assessment of particulates as chemical warfare agents; Apparatus and techniques utilized in toxicological studies on chemical warfare agents; Physiological mechanisms concerned in the production of casualties by exposure to heat; Miscellaneous toxicological studies

PB 158 507 $22.25

Office of Scientific Research and Development. Div. 9.
CHEMICAL WARFARE AGENTS, AND RELATED CHEMICAL PROBLEMS. PARTS III-VI. Summary technical rept. vol 1 on Contract OEMsr-1131. 1946, downgraded 23 Apr 58, declassified 25 Mar 60, 418p. 3,570 refs. AD-234 249.

DESCRIPTORS: *Chemical warfare agents, Sulfur mustards, Nitrogen mustards, Reaction kinetics, Chemical reactions, Proteins, Enzymes, Cells (Biology), Toxicity, Pathology, Poisonous gases, Gases, Skin, Chemical warfare injuries, Countermeasures, Chlorides, Amides, Vesicants, Protective ointments, Protective clothing, Impregnation, Textiles, Decontamination, Arsenides, Detection, Identification, Sampling, *Lubricants, *Hydraulic fluids, Fuels, *Propulsion, Insect control, *Pest control, *Rodenticides, Drugs, Malaria, Synthesis.
Contents:
Physiological mechanisms of action of the sulfur and nitrogen mustards: Chemical reactions of sulfur and nitrogen mustards; Kinetics of reactions of sulfur and nitrogen mustards; Effects of sulfur and nitrogen mustards on proteins, enzymes, and cells; Systemic pharmacology and pathology of sulfur and nitrogen mustards; Mechanisms in production of cutaneous injuries by sulfur and nitrogen mustards
Protection against chemical warfare agents: Chloramides for protection against vesicants; Protective ointments; Chloramide-impregnated type of protective clothing; Preparation of carbon-treated fabrics; Deterioration, laundering, and decontamination of carbon-treated fabrics; Laboratory evaluation of probable protective value of fabrics; Evaluation of chloramide- and carbon-treated fabrics by means of gas chamber tests and field wearing trials; Antidotes for poisoning by arsenicals and other chemical warfare agents; Decontamination
Detection and analysis of chemical warfare agents: Introduction to studies on detection, identification. assessment, and field analysis of chemical warfare agents; Detection of certain chemical warfare agents; Identification of chemical warfare agents; Field sampling of persistent chemical warfare agents under subtropical and tropical conditions; Quantitative determination of certain chemical warfare agents; Instrumental methods for determination of certain chemical warfare agents; Miscellaneous analytical studies
Miscellaneous investigations: Synthesis of compounds for studies of lubricants and hydraulic fluids; Special fuels for propulsion; Insect and rodent control; Synthesis of antimalarial intermediates and drugs; Glossary; Bibliography

Radiobiology

NYO-9341 $1.10

Delaware U., Newark.
THE RELATION OF GENOME NUMBER TO RADIOSENSITIVITY. Final rept. 1 Sep 54-31 May 61 on Contract AT(30-1)-1752. 7p.

HW-68645 $4.60

Hanford Atomic Products Operation, Richland, Wash.
PLUTONIUM INHALATION STUDIES. III. EFFECT OF PARTICLE SIZE AND TOTAL DOSE ON RETENTION AND TRANSLOCATION, by W. J. Bair and D. H. Willard. Rept. on Contract AT(45-1)-1350. Mar 61, 49p.

UCRL-9715 $2.00

Lawrence Radiation Lab., U. of California, Berkeley.
THE FINE STRUCTURE OF NORMAL AND IRRADIATED YEAST CELLS AND YEAST RIBOSOMES, by James K. Koehler. Rept. on Contract W-7405-eng-48. June 61, 80p.

NYO-9572 $3.60

Massachusetts Inst. of Tech., Cambridge.
A STUDY OF THE EFFECTS OF SUB-STERILIZATION DOSES OF RADIATION ON THE STORAGE LIFE EXTENSION OF SOFT-SHELLED CLAMS AND HADDOCK FILLETS, by John T. R. Nickerson, Samuel A. Goldblith, and Edmund B. Masurovsky. Quarterly progress rept. May-July 61, on Contract AT(30-1)-2329. 32p.

ORO-465 $1.10

Texas U., Austin.
REVERSAL OF RADIATION DAMAGE IN ALGAE. Final scientific rept. on Contract AT(40-1)-2567. Sep 61, 6p.

TID-13499 $1.10

Wisconsin U., Madison.
GENETIC EFFECTS OF CUMULATIVE IRRADIATION IN RATS. Technical progress rept. on Contract AT(11-1)-697. Sep 61, 9p.

CHEMISTRY

DP-626 $0.50

Savannah River Lab., Aiken, S. C.
PROCESSING OF POWER REACTOR FUELS, comp. by J. H. Owen. Quarterly progress rept. no. 15, 1 Apr-1 July 61, on Contract AT(07-2)-1. Sep 61, 12p.

Analytical Chemistry

NAA-SR-6426 $0.50

Atomics International, Canoga Park, Calif.
ISOTOPIC OXYGEN RATIO ANALYSIS IN BeO BY MASS SPECTROMETRY, by R. A. Meyer, S. B. Austerman, and D. G. Swarthout. Rept. on Contract AT(11-1)-GEN-8. Oct 61, 11p.

GAMD-2412 $2.60

General Atomic Div., General Dynamics Corp., San Diego, Calif.
IMPERMEABLE GRAPHITE EVALUATION PROCEDURE USED AT GENERAL ATOMIC, by B. F. Disselhorst and W. L. Wyman. Rept. on Contract AT(04-3)-314. Aug 61, 29p.

APEX-617 $1.00

General Electric Co., Cincinnati, Ohio.
LAB PLATE-OUT STUDY I; SPECIAL LOOPS INSTALLED IN CTF DURING IET 21 AND 25, by M. N. Myers. Rept. on Contracts AF 33(600)-38062 and AT(11-1)-171. Apr 61, 48p.

ORO-444 $1.10

Mallinckrodt Chemical Works, Hematite, Mo.
THE CHARACTERIZATION OF UO_2 POWDERS. Monthly progress rept. no. 7 on Contract AT(40-1)-2699. Apr 61, 6p.

Organic Chemistry

AD-259 144 $1.60

Coating and Chemical Lab., Aberdeen Proving Ground, Md.
THE IDENTIFICATION OF POLYOLS IN ALKYD RESINS BY PROGRAMMED TEMPERATURE GAS CHROMATOGRAPHY, by G. G. Esposito. 2 Mar 61, 17p. 7 refs. Rept. no. CCL #104.

DESCRIPTORS: *Alkyd resins, *Chromatographic analysis, *Alcohols, *Glycols, *Glycerols, Ethanes, Methanes, Propanes, Butanes, Ethylenes, Propenes, Amines, Acetates, Chemical analysis, Separation, Solvent extraction, Gases, Acetic anhydrides, Chemical reactions.

A temperature programmed gas-liquid technique is employed for the characterization of polyhydric alcohols used in alkyd resins. The polyols are chromatographed as their acetates which provides a scheme for analyzing a broad range of alcohols which is not feasible when they are analyzed directly by gas chromatography. An alkyd is subjected to "aminolysis" (amine reaction with esters) followed by direct acetylation with acetic anhydride. The acetates, in chloroform, are chromatographed on polar and non-polar columns. All of the nine polyols investigated were separated and identified. (Author)

TID-13295 $1.60

Pittsburgh U., Pa.
STUDIES OF COORDINATION COMPOUNDS CONTAINING OLEFIN AND OLEFIN-LIKE LIGANDS, by Bodie E. Douglas. Progress rept. 1 Aug 60-31 July 61, on Contract AT(30-1)-2274. July 61, 12p.

K-436(Del.) $1.60

[Union] Carbide [Nuclear Co.] Oak Ridge, Tenn.
VISCOSITY, DENSITY AND COMPOSITION OF URANIUM HEXAFLUORIDE AND CHLOROTRIFLUOROETHYLENE LIQUID POLYMER SOLUTIONS, by J. L. Gabbard and R. E. McHenry. July 49, 16p.

TID-13864 $1.60

Western State Coll., Colo.
SOLVENT EXTRACTION STUDIES, by C. Gerald Warren. Rept. on Contract AT(11-1)-749. Sep 61, 16p.

Physical Chemistry

TID-13926 $1.60

Institute for the Study of Rate Processes, U. of Utah, Salt Lake City.
STATISTICAL THEORY OF SURFACE TENSION, by Seihun Chang, Taikyue Ree and others. Technical rept. no. XLI on Contract AT(11-1)-82. Oct 61, 21p.

PB 157 489 $12.00

Institute of Engineering Research, U. of California, Berkeley.
A STUDY OF OXYGEN RECOMBINATION ON METALLIC SURFACES BY MEANS OF AN ATOMIC BEAM, by Stuart Alfred Hoenig. Doctoral thesis. Rept. on Contract Nonr-222(45). 7 Oct 60, 167p. 88 refs. Technical rept. HE-150-173; Series no. 20, issue no. 130; AD-249 612.

DESCRIPTORS: Catalysis, *Oxygen, *Recombination reactions, Metals, Surfaces, Atoms, *Molecular beams, Adsorption, Re-entry vehicles, Catalysts.

A series of measurements of the catalytic recombination coefficient gamma for recombination of oxygen atoms on various metallic surfaces has been made. The technique used in the experiment involved a molecular beam and a new type detector for calibration of the atomic oxygen content of the beam. The previous experiments in the field are discussed, their results compared, and an evaluation of their probable relative validity is made. The results are in general qualitative agreement with the present theories of the electronic basis of catalysis and the variation in the data is somewhat less than that reported by other observers. (Author)

TID-13903 $1.60

Institute of Metals and Explosives Research, U. of Utah, Salt Lake City.
TESTS OF A PLATINIC ACID-THORIUM HYDROXIDE CATALYST FOR HYDROGEN-OXYGEN RECOMBINATION, by C. Keith Hanson, Ralph M. Horton and Milton E. Wadsworth. Technical report no. XI on Contract W-7405-eng-26. Jan 61, 15p.

PB 155 391 $1.60

Naval Propellant Plant, Indian Head, Md.
THE GAS CHROMATOGRAPHIC SEPARATION OF CLOSELY BOILING ISOMERS ON A PREPARATIVE SCALE, by R. K. Brookshier, J. L. Mack, and G. B. Wilmot. 30 Nov 60, 15p. 10 refs. Technical memo. rept. 184; AD-252 891.

DESCRIPTORS: *Chromatographic analysis, *Butenes, Gases, Butadienes, Analysis.

The application of gas chromatography to the large-scale separation of mixtures of cis-2-butene, trans-2-butene, 1-butene, butane, and 1, 3-butadiene and of cis- and trans-perfluoro-2-butene is discussed. Conventional apparatus was used with no changes except that columns of larger diameter were needed. For the mixtures separated here, compounds with a purity of 99.95% or more were isolated even in those cases where resolution of adjacent peaks was incomplete. (Author)

NYO-9804 $1.60

Westinghouse Research Labs., Pittsburgh, Pa.
STUDY OF NEGATIVE IONS WITH A CYCLOIDAL INSTRUMENT, by W. J. Lange. July 61, 17p. WRL-808-D801-P2.

EARTH SCIENCES

TEI-795 $1.60

Geological Survey, Washington, D. C.
INTERIM REPORT ON SEISMIC VELOCITIES OF THE OAK SPRING FORMATION U12e AND U12b TUNNEL SYSTEMS, NEVADA TEST SITE, NYE COUNTY, NEVADA, by R. M. Hazlewood. June 61, 19p.

SCTM-91-61(72) $1.60

Sandia Corp., Albuquerque, N. Mex.
A METHOD OF CALIBRATING BENIOFF SEISMOMETERS, by H. J. Plagge, H. G. Laursen, and C. J. Northrup, Jr. Aug 61, 17p.

Climatology and Meteorology

PB 155 933 $5.60

Armour Research Foundation, Chicago, Ill.
WARM FOG AND CLOUD DISSIPATION, by Alvin Lieberman. Final rept. 15 June 59-14 Dec 60, on Contract AF 19(604)5910. Jan 60, 59p. 10 refs. ARF 3153-6; AFCRL 260; AD-254 489.

DESCRIPTORS: *Fog, *Clouds, Drops, Ions, Electrical effects, Electrical properties, Carbon black, Desiccants.

Emphasis was placed on methods involving electrical charging. The amount of fog dissipation that could be expected as a result of introducing charged droplets was analyzed theoretically, the method was shown to be feasible. A laboratory study was carried out in small fog chambers, and it was found that introduction of charged scavenging droplets accelerated dissipation of laboratory fog. Evaluation of charging techniques indicated that electrostatic atomization was superior to corona charging. An electrostatic atomizer design was developed for subsequent field use. Addition of cationic surfactants to affect the electrical properties of fog was also investigated. Sampling of droplets larger than 8 microns was investigated in connection with the use of the ARF particle counter to determine fog drop-size distribution. The following methods were tested: aircraft dispersion of carbon black, aircraft dispersion of cationic surfactants, ground dispersion of desiccant (calcium chloride) droplets, and ground dispersion of electrically charged droplets. The effects of charged droplet dispersers on the normal atmospheric electric field were measured, and a reversal of the normal field was found, with resulting gradients up to 900 v/m. (Author)

PB 155 850 $1.60

Army Signal Research and Development Lab., Fort Monmouth, N. J.
THE PRESSURE-VERSUS-HEIGHT RELATIONSHIP, A MEASUREMENT QUESTION, by Abraham Arnold. Jan 61, 14p. USASRDL Technical rept. 2165; AD-251 541.

DESCRIPTORS: *High altitude, Pressure, Meteorological data, Measurement, Upper atmosphere, Atmospheric sounding, Mathematical analysis, *Temperature, Errors, *Barometric pressure.

Two procedures for establishing a correspondence between pressure and height in the atmosphere are discussed. The report is concerned with the problem of obtaining a better pressure-versus-height correspondence for the procedure in which a height is given and a pressure is computed. It is shown that the altitude above which a pressure should be provided is dependent on the error in the mean temperature. For example, if the error in the mean temperature is one percent, the use of a hypsometer gives a better pressure-versus-height correspondence at altitudes above 88,000 feet. (Author)

PB 156 627 $1.60

Army Signal Research and Development Lab., Fort Monmouth, N. J.
RESULTS OF IGY ROCKET-GRENADE EXPERIMENTS TO MEASURE TEMPERATURES AND WINDS ABOVE THE ISLAND OF GUAM, by W. Nordberg and W. G. Stroud. Feb 61, 19p. 11 refs. USASRDL Technical rept. 2177; AD-254 655.

DESCRIPTORS: Pacific islands, *Temperature, Density, Measurement, *Atmosphere, Motion, *Upper atmosphere, Meteorology, Micronesia, Solar atmosphere, Meteorological data, *Wind.

Temperature and wind measurements up to an altitude of 80 km resulting from nine rocket-grenade firings during Nov 1958 on the island of Guam are presented and discussed. Densities and pressures were calculated from the temperature data. The temperature results agree with previous grenade measurements at White Sands, N. M. They show a peak temperature of approximately 270 K at 47 km. Weak westerly circulation prevails between 35 and 70 km. An abrupt reversal in wind direction from east to west between 25 and 35 km was observed. The weak westerlies sometimes are subjected to major disturbances near the 55-km level. Toward 70 km the westerlies generally seem to diminish. (Author)

PB 155 849 $17.00

Army Signal Research and Development Lab., Fort Monmouth, N. J.
SIGNAL CORPS COOPERATIVE HIGH ALTITUDE RADIOSONDE FLIGHTS JANUARY 1957 THROUGH JANUARY 1959. PART V. VOLUME I, by Walter Conover, Marvin Lowenthal, and Emily C. Taylor. 15 Sep 60, 267p. 7 refs. USASRDL Technical rept. 2147; AD-252 629.

DESCRIPTORS: *Radiosondes, *Atmosphere, *Stratosphere, *Meteorological data, *Wind, *Meteorological instruments, Temperature, *Meteorological charts, Determination, Climate, Meteorological balloons, Measurement, High altitude.

A summary is presented of data from Signal Corps cooperative high-altitude radiosonde flights. Monthly average temperatures and winds and estimates of their variations are included for eleven stations in the North American area, covering the period from January 1957 through January 1959 for the months of January, April, July and October. Mean profiles, their variations, and mean cross sections are included. A descriptive analysis is made of the graphical presentations. (Author)

SCTM-222A-60(52) $1.60

[Sandia Corp , Albuquerque, N Mex.]
PRELIMINARY REPORT ON A NEW ALUMINUM HUMIDITY ELEMENT, by C. M. Stover. Apr 61, 13p.

PB 156 982 $5.60

Texas A. and M. Research Foundation, College Station.
EFFECTS OF CONDENSATION, EVAPORATION AND RAINFALL ON THE DEVELOPMENT OF MESOSCALE DISTURBANCES: A NUMERICAL EXPERIMENT, by Yoshikazu Sasaki. Technical rept. no. 5 on Contract no. NSF-G7417 and Technical rept. no. 1 on Contract AF 19(604)6136. Sep 60, 56p. 8 refs. Reference 60-18T; AFCRL-TN-60-814; AD-249 687.

DESCRIPTORS: *Storms, Raindrops, Condensation, Evaporation, Weather forecasting, *Thermodynamics, Equations of motion, Digital computers.

Solutions for a mesoscale numerical prediction model including the equations of motion and thermodynamics in the (x, z, t) coordinate system were obtained using the IBM 704. At the lower boundary, z = 0, considered to be flat surface, the kinematic condition w = 0 was used. At the upper boundary, z = 30,000 ft, the condition w = 0 was prescribed. The equations were solved numerically using delta z = 2500 ft, delta x = 7.5 n mi, and delta t = 1 min; and initial condition representing a conditionally unstable stratification of the atmosphere is assumed. The computations were made for the following cases: (1) dry air only, (2) simple condensation process where moisture is assumed to condense when the air becomes saturated, (3) evaporation process considering, in addition to the above condensation process, when air is not saturated but does contain liquid water, and (4) the effect of descending motion of liquid water in order to simulate the effect of falling rain. Computations were carried out for more than 240 time steps (4 hrs) for each of these cases using the same initial condition. (Author)

Physics of the Atmosphere

AD-255 767 $6.60

Army Signal Missile Support Agency, White Sands Missile Range, N. Mex.
SONIC STRUCTURE OF THE MESOSPHERE, by Willis L. Webb and Kenneth R. Jenkins. Apr 61, 61p. 44 refs. Special rept. no. 50.

This report released by the cognizant military agency for sale to the public 27 Nov 61.

DESCRIPTORS: *Wind, Temperature, *Sounding rockets, Sound, Propagation, Velocity, *Upper atmosphere, Atmospheric sounding, North America, Atmosphere, Refractive index, Atmospheric refraction.

Temperature and wind data up to altitudes of 200,000 ft were obtained with meteorological rockets at various locations over North America during the seasons of 1959 and 1960. Seasonal and geographical variations of the atmosphere's acoustical structure, as derived from these data, are illustrated. The thermal and flow effects on the sonic profiles in the lower mesosphere are pointed out. Data in the form of individual cases of interest and seasonal summaries for several locations are presented. (Author)

PB 155 671 $1.10

Lincoln Lab., Mass. Inst. of Tech., Lexington. THE DISTRIBUTION OF ELECTRONS IN THE UPPER IONOSPHERE FROM BACKSCATTER OBSERVATIONS, by J. V. Evans. Rept. on Contract AF 19(604)7400. 3 Apr 61, 9p. Suppl. 1 to Rept. 3G-0002, PB 153 484, AD-247 860; AD-254 143.

DESCRIPTORS: *Ionosphere, *Electrons, Upper atmosphere, Distribution, Density, Reflection, Electromagnetic wave reflections.

Studies of the results presented in the previous report (AD-247 860) revealed a small but systematic error in the way in which the average noise level on the time-base was estimated. The sense of this error was to overestimate the noise level by about 6%. However, above this height the electron density was previously underestimated by an amount which increased progressively with height. The distribution of electrons is now such that there are approximately 2.2 times more above the level of the critical frequency than below. This ratio is still somewhat less than that observed (about 3:1) in most Faraday rotation experiments using moon-reflected signals (Evans and Taylor, 1961, Proc. Roy, Soc., in publication). The curve showing the critical frequency as a function of height normalized to 10 Mc at the F2 maximum is redrawn. A comparison is made between this curve and the electron density distribution observed by means of a rocket flight from Wallops Island, Virginia. There appears to be a large measure of agreement between these two sets of measurements. These observations differ considerably from most other results for the way in which electrons are distributed above the F2 maximum. Thus the current view that the electron density falls only slowly above the peak of the F2 layer (Ratcliffe, J. A., and Weekes, K., Physics of the Upper Atmosphere, p. 435, 1960) must be questioned--at least for certain latitudes. (Author)

AD-256 952 $6.60

Ohio State U. Research Foundation, Columbus. INFRARED ABSORPTION BY MINOR ATMOSPHERIC CONSTITUENTS, by Darrell E. Burch, Edgar B. Singleton and others. Final rept. (Rept. no. 3) on Contract AF 19(604)2633. Dec 60, 70p. 16 refs. RF proj. 778; AFCRL-412.

DESCRIPTORS: *Absorption, Infrared gas analyzers, *Infrared radiation, *Atmosphere, Nitrogen compounds, Oxides, Molecules, Tests, Tables, Gases, Water vapor.

A study is presented of the ralative pressure broadening abilities of all of the absorbing gases studied in the research program, and of various inactive gases. Absorption by water vapor in the region of its vibration-rotation bands at 1595 cm^{-1}, at 5332 cm^{-1}, and near 3700 cm^{-1}: absorption by nitrous oxide bands at 2563 cm^{-1}, 2461 cm^{-1}, 1285 cm^{-1}, 1167 cm^{-1}, 629 cm^{-1}, and at 589 cm^{-1}. (Author) (See also PB 155 440)

ENGINEERING

KAPL-M-JAM-4 $3.60

Knolls Atomic Power Lab., Schenectady, N. Y. DEFLECTION MEASUREMENTS BY MAGNETIC MEANS. SYSTEM DESCRIPTION, by J. A. McCann and H. G. Garab. Rept. on Contract W-31-109-eng-52. May 61, 28p.

Chemical Engineering

IS-334 $6.60

Ames Lab., Iowa State U. [of Science and Tech.] MASS TRANSFER COEFFICIENTS AND INTERFACIAL AREA IN A ONE STAGE PULSE COLUMN, by Alvin Eugene Konopik and Lawrence Burkhart. Rept. on Contract W-7405-eng-82. Sep 61, 66p.

ARF-1167-15 $3.60

Armour Research Foundation, Chicago, Ill. FEASIBILITY STUDY OF A NEW MASS FLOW SYSTEM, by J. W. Haffner. Quarterly rept. no. 5 on Contract AT(11-1)-578. Sep 61, 36p.

TID-13711 $1.60

Engineering Research Labs., Columbia U., New York. BASIC EXPERIMENTAL STUDIES ON BOILING FLUID FLOW AND HEAT TRANSFER AT ELEVATED PRESSURES, by Bruce Matzner. Monthly progress rept. on Contract AT(30-3)-187. July 61, 16p.

TID-13649 $1.60

General Mills, Inc., Minneapolis, Minn. PROGRESS REPORT FOR JULY AND AUGUST, 1961, on Contract AT(11-1)-401. 13p.

HW-39938 $1.10

Hanford Atomic Products Operation, Richland, Wash. INVENTION DESCRIPTION - DEVISES FOR IMPROVING THE EFFICIENCY OF SEPARATION IN PULSED LIQUID-LIQUID EXTRACTION COLUMNS, by O. H. Koski. Nov 55, 8p.

HW-70768 $1.60

Hanford Atomic Products Operation, Richland, Wash.
STRONTIUM AND CESIUM LOADING CHARACTERISTICS OF DECALSO, LINDE 4A AND CLINOPTILOLITE COLUMNS, by L. L. Ames, Jr. Rept. on Contract AT(45-1)-1350. Aug 61, 14p.

KAPL-M-SLJ-4 $1.10

Knolls Atomic Power Lab., Schenectady, N. Y.
DELIVERY ACCURACY OF THE METROHM POTENTIOGRAPH, by S. L. Jones. Rept. on Contract W-31-109-eng-52. May 61, 9p.

MCW-1466 $0.50

Mallinckrodt Chemical Works, Weldon Spring, Mo.
URANIUM RECOVERY FROM SCRAP URANIUM TETRAFLUORIDE BY WET REVERSION WITH SODIUM HYDROXIDE, by E. P. Grattan and W. T. Trask. Topical rept. on Contract W-14-108-eng-8. Nov 61, 11p.

CF-61-3-129(Rev. 1) $1.10

Oak Ridge National Lab., Tenn.
TrU FACILITY - ALPHA BOX ACCESSORIES - MANIPULATOR OPERABLE SPHERICAL JOINT CLAMP, by B. B. Klima. July 61, 4p.

PB 158 505 $31.00

Office of Scientific Research and Development. Div. 10.
MILITARY PROBLEMS WITH AEROSOLS AND NONPERSISTENT GASES. Summary technical rept. vol. 1 on Contract OEMsr-1131. 1946, declassified 2 Aug 60. 724p. 750 refs. AD-221 596.

DESCRIPTORS: *Gas masks, *Gas mask canisters, *Carbon, *Charcoal, Impregnation, Adsorption, Molybdenum, Vanadium, Copper, Silver, Chromium, *Gases, Penetration, Resins, *Carbon compounds, *Monoxides, Reagents, *Meteorology, *Micrometeorology, *Chemical warfare agents, Clouds, *Aerosols, Stability, Coagulation, Electrical properties, Optics, Density, Evaporation, *Metallic smoke deposits, *Smoke screens, Smokes, *Poisonous gases, *White phosphorus, *Munitions, *Liquids, Atomization, Incendiary bombs, Bombs, Smoke generators, Generators, Drops, Particles, *Herbicides, Scattering, *Insect control, *Fluorine, *Cyanogen chlorides, Chlorides, *Hydrocyanic acids, Acids, Stabilization, *Fog, Gas diffusion, Fluid flow, Wind tunnel models, *Labeled substances, *Radioactive isotopes.

Contents:
The gas mask: U. S. gas masks; Testing of gas mask charcoal and canisters; Manufacture of activated charcoal; Impregnation of charcoal; Surveillance of impregnated charcoal; Adsorption and pore size measurements on charcoals and whetlerites; Mechanism of chemical removal of gases; The adsorption wave; Canister design; The aerosol filter; Performance of U. S. and foreign gas canisters; Protection against carbon monoxide; Criticisms and recommendations
Micrometeorology and the behavior of chemical warfare gas clouds: General meteorological principles; Micrometeorological instruments; Behavior of gas clouds; Field sampling methods for nonpersistent gases;
Aerosols: General properties of aerosols; Stability of aerosols and behavior of aerosol particles; Formation of aerosols; Optical properties of aerosols; Measurement of particle size and size distribution; Filtration of aerosols; Methods of testing smoke filters; Smoke screens; Travel and persistence of aerosol clouds; Theory of obscuration
New munitions for smoke and toxic gases: Introduction; Atomization of liquids; Thermal generator munitions; Fuel blocks for thermal generator munitions; New screening smoke mixtures; Exhaust smoke generator for airplane engines; Munitions for dispersal of liquid droplets; Munitions for the dispersal of solid particles; Dispersion of herbicides; Plasticized white phosphorus
Miscellaneous topics: Insect control - The development of equipment for the dispersal of DDT; Inorganic toxic gases; The preparation of fluorine; The stabilization of cyanogen chloride; Stabilization and flame inhibition of hydrogen cyanide; Wind-tunnel studies of fog dispersal, gas diffusion, and flow over mountainous terrain; Radioactive tracers; Glossary; Bibliography

K-1271(Del.) $4.60

Union Carbide Nuclear Co., Oak Ridge, Tenn.
A PILOT PLANT FOR THE REDUCTION OF URANIUM HEXAFLUORIDE TO URANIUM TETRAFLUORIDE WITH TRICHLOROETHYLENE, by J. E. Baker, H. V. Klaus and others. May 56, 47p.

Electrical and Electronic Engineering

AD-261 960 repriced $1.50

American Machine and Foundry Co., Alexandria, Va.
ULTRATHERMIC CAPACITOR, by C. W. H. Barnett. Rept. for Jan 58-Dec 60 on Contract AF 33(616)5422. Mar 61, 52p. WADD Technical rept. 61-50.

DESCRIPTORS: *Capacitors, *Ceramic capacitors, *Subminiature electrical equipment, Subminiature electronic equipment, Nuclear propulsion, Aircraft, Radioactivity, Dielectric films, Flame spraying, Plasma jets, Electrodes, Aluminum, Foils, Design, Tests, Life expectancy, Electrical properties, Temperature, Pressure, Vibration, Shock, Acceleration.

The design of a capacitor capable of operation at 500 C and in nuclear radiation is presented. This design is the result of the development of processes of spraying dielectric material by use of oxyacetylene-flame spraying and spraying by means of a plasma jet. The processes led to the development of 2 types of capacitors, namely, the monolithic and the rolled-tape types. The monolithic type of capacitor was produced by spraying alternate layers of electrode and dielectric material on a rotating ceramic core. The tape capacitor was made by spraying dielectric material on an aluminum-foil tape and then rolling 2 of these tapes to form a conventional rolled-type of capacitor. Tests

established that, considering the temperature and radiation requirements, aluminum and alumina are the best materials for fabricating this type of component. Two sizes of unit were designed, a small unit having the design goal of .001 to .01 microfarad and a larger unit with the design goal of 0.1 to 1.0 microfarad. The development phase showed that the design goal is realistic and also confirmed that a program for the production of an ultrathermic capacitor is feasible. (Author)

PB 155 325 $2.60

Army Signal Research and Development Lab., Fort Monmouth, N. J.
DEGENERATE TYPE PARAMETRIC AMPLIFIER OPERATING IN THE VHF REGION, by Werner Rupp. 31 May 60, 26p. 11 refs. USASRDL Technical rept. 2150; AD-250 035.

DESCRIPTORS: *Electronic circuits, Design, *Microwave amplifiers, Signal-to-noise ratio, Noise (Radio), Narrowband, Admittance, Very high frequency.

An experimental parametric amplifier was designed and tested for use as a narrow-band, sensitive, low-noise preamplifier for receivers in the VHF region. Essentially it acts as a one-port negative conductance amplifier. In the degenerate mode of operation, the pump frequency is equal to about twice the signal frequency. Therefore, no idler is necessary, and the circuit is relatively simple. The circuit utilizes two silicon diodes as voltage-variable capacitors and makes extensive use of the impedance-transforming properties of coaxial transmission lines.

PB 155 327 $1.60

Army Signal Research and Development Lab., Fort Monmouth, N. J.
FABRICATION AND EVALUATION OF P ON N PHOTOVOLTAIC CONVERTERS, by J. S. Kesperis. Nov 60, 18p. 6 refs. USASRDL Technical rept. 2169; AD-248 022.

DESCRIPTORS: *Photoelectric cells, Solar energy, Boron, Diffusion, Production, Manufacturing methods, Effectiveness, Resistance, Diodes, Voltage, Temperature.

Eleven- to twelve-percent efficiency solar cells were fabricated at USASRDL by using a boron-diffusion technique, yielding 2 times 10 to the 20th power atoms per cubic centimeter in surface concentration and junction depths of 1.25 microns. The results indicated that (1) Contact resistances obtained from limiting forward-diode-current ac resistances varied from 0.2 ohms; (2) Net series resistances from the illuminated I-V characteristic were slightly more than 2 ohms; (3) Reverse dark current measurements revealed back impedances of 600 ohms to 7200 ohms; (4) Thermal measurements indicated a temperature coefficient of 0.54 percent per degree C; (5) Spectral response measurements showed a peak at 1.6 ev with a half-point falloff bandwidth of 1.36 ev; and (6) Collection efficiencies in excess of 26 ma per sq. cm were obtained at junction depths of 1.25 microns. The diffusion technique is discussed in this report and methods for improvements in parameters and processes for ultrahigh efficient cells are pointed out. (Author)

PB 155 948 $2.60

Army Signal Research and Development Lab., Fort Monmouth, N. J.
USE OF RAWIN SET AN/GMD-2 WITH RADIOSONDE SET AN/DMQ-6, by Arthur A. Coppola. Jan 61, 26p. 3 refs. USASRDL Technical rept. 2171; AD-251 542.

DESCRIPTORS: *Radiosondes, *Recording devices, Range, *Sounding rockets, Instrumentation, Telemetering data, *Tracking, Radio equipment, High altitude, Wind, Temperature, Determination, Parachute descents, *Meteorological instruments.

A series of test flights was conducted at White Sands, New Mexico, and Cape Canaveral, Florida, for the purpose of testing the performance of a rocket radiosonde system employing an Arcas rocket vehicle, Radiosonde Set AN/DMQ-6, and Rawin Set AN/GMD-2 as a tracking and receiving equipment. Both laboratory- and contractor-built models of Radiosonde Set AN/DMQ-6 (a rocket-parachute modification of balloon-borne Radiosonde Set AN/AMQ-9) were evaluated. Analysis of data obtained indicates that Rawin Set AN/GMD-2 is capable of tracking the AN/DMQ-6 both in angle and range, during the entire portion of the rocket-parachute flight of the Arcas rocket, and telemetering data during the parachute descent. The necessary modifications to Rawin Set AN/GMD-2 and the procedure used for obtaining data are described. (Author)

PB 155 949 $1.60

Army Signal Research and Development Lab., Fort Monmouth, N. J.
A VARIABLE TIME-CONSTANT SERVO SYSTEM, by William Todd. Feb 61, 18p. USASRDL Technical rept. 2173; AD-252 457.

DESCRIPTORS: *Servo systems, *Direction finding, *Meteorological radio, *Tracking, *Radiosondes, Balloons, Tests, Automatic, Feedback oscillators, Timing circuits.

An automatic method for varying the time-constant of a servo system is described. The time-constant is adjusted so that when input errors are low, the time-constant is increased (to obtain the greatest integration time); and when input errors are large, the time-constant is reduced to provide minimum velocity lag, thus permitting the servo to follow rapidly changing functions. Application of the principles to a meteorological direction finder (Rawin Set AN/GMD-1) is described. (Author)

NAA-SR-MEMO-6515 $1.10

Atomics International, Canoga Park, Calif.
SNAP 10A ESTIMATED ELECTRICAL CHARACTERISTICS, by J. C. Cooper. June 61, 8p.

PB 155 586 $2.60

Diamond Ordnance Fuze Labs., Washington, D. C.
A 2D 30-Mc IF AMPLIFIER, by George R. Yetter and Lawrence L. Hall. 24 Feb 61, 24p. 6 refs. DOFL TR-894; AD-254 005.

DESCRIPTORS: *Intermediate frequency amplifiers, High frequency, *Subminiature electronic equipment, Tuned circuits, Design, *Electronic circuits, *Packaged circuits, Packaging, Ceramic materials, *Printed circuits, Shielding, Transformers, Transistors, Manufacturing methods, Tests, Electrical equipment, Measurement, Carbon resistors, *Coupling circuits, Ceramic capacitors, Silver plating, Amplifiers.

A new concept in the design and packaging of microminiature high-frequency circuits was developed. With this concept, fixed-tuned, 30 mc IF amplifiers with 100 db gain have been designed and built in volumes less than 1/5 cu in. An assembly consists of five stages, each built on a ceramic wafer measuring 0.6 x 0.6 x 0.020 in. Each stage has approximately 20 db gain at 30 mc with a 6 mc bandwidth. Electrically, each unit consists of five iterative, transformer-coupled amplifier stages with RC decoupling. The fixed-tuned, toroidal transformers were trimmed to resonate with the total interstage capacitance. Amplifier stability was obtained by mis-matching the stages. A noise figure of 8.5 db was obtained. The isolation of stages, the miniature toroidal transformers, and a shelved housing providing both shielding and rigidity, are successfully integrated in this model. (Author)

PB 155 826 $2.60

Diamond Ordnance Fuze Labs., Washington, D. C.
BINARY COUNTER PERFORMANCE, by Philip Emile, Jr., E. L. Cox, and A. I. Goodman. 17 Mar 61, 25p. 2 refs. DOFL TR-858; AD-254 822.

DESCRIPTORS: *Transistors, *Pulse counters, *Electronic circuits, Germanium, Silicon, *Subminiature electronic equipment, Design, High temperature research, Temperature, Failure (Mechanics), Reliability, Tests.

The performance of several two-transistor binary counter circuits is described. The voltage, frequency and load variations which the circuits would tolerate before failure are listed. The tests were performed at various operating temperatures, and several types of transistors, both germanium and silicon, were used. A critical analysis of the performance trends is presented. A low-power design using germanium transistors dissipated 20 mw per stage and operated up to 65 C and a maximum frequency of 4.5 kc. One circuit design using germanium transistors performed satisfactorily up to 70 C and a maximum frequency of 27 kc. A binary counter using silicon transistors, type 2N697, performed satisfactorily at rates up to 45 kc and operated over the temperature range -40 C to +150 C with essentially no changes in its operating parameters. For operation over this wide temperature range, it was necessary to use special capacitors. (Author)

TID-13865 $8.10

Digital Computer Lab., U. of Illinois, Urbana.
ENGINEERING MODEL OF A PARTIAL SWITCHING EFFECT IN FERRITE CORES, by Sylvian R. Ray. Sep 61, 84p. ILU DCL-111.

DLCS-3360201 $1.10

Duquesne Light Co., Shippingport, Pa.
CALIBRATION OF PRESSURIZER NARROW RANGE PRESSURE INSTRUMENTATION, CORE I, SEED 2. Sep 61, 6p.

DLCS-3370102 $1.60

Duquesne Light Co., Shippingport, Pa.
PERIODIC CALIBRATION OF REACTOR PLANT FLOW INSTRUMENTATION, CORE I, SEED 2. Sep 61, 14p.

PB 157 389 $1.60

Electronics Research Lab., U. of California, Berkeley.
A DESIGN PROCEDURE FOR TRANSISTOR AMPLIFIERS USING LOCAL RL-FEEDBACK, by R. K. Tuttle. Rept. on Contract Nonr-222(74). 10 Oct 60, 19p. 7 refs. Rept. no. 117; IER series no. 60, issue no. 322; AD-249 350.

DESCRIPTORS: *Transistor amplifiers, Design, Inductance, Resistance, *Feedback amplifiers, *Transistors, Amplifiers.

Until recently, the most efficient method of broadbanding transistor amplifiers was thought to be shunt-peaking. However, two methods involving local feedback have been shown to give a better gain-bandwidth product (GBW). One of the schemes involved resistive feedback and a parallel RC combination in the collector lead. The other utilizes shunt-feedback with a series RL in the feedback loop. This method is analyzed in this report, and a design procedure is established. Calculated and experimental results are in agreement to within less than 10 per cent. These stages may be cascaded with a bandwidth shrinkage that is comparable to shunt-peaking. (Author)

PB 155 746 $6.60

Electronics Research Lab., U. of California, Berkeley.
EXPERIMENTAL INVESTIGATION OF LARGE-SIGNAL TRAVELING-WAVE MAGNETRON THEORY, by J. R. Anderson. Rept. on Contract DA 36-039-sc-85278. 12 Sep 60, 70p. 18 refs. IER series no. 60, issue no. 314; AD-249 351.

DESCRIPTORS: *Traveling wave tubes, *Magnetrons, Theory, Amplifiers, Microwave equipment, *Backward wave amplifiers, Phase distortion, Electron guns, Electric fields, Magnetic fields.

Experiments conducted on a beam-type backward-wave amplifier which closely approximates the theoretical thin-beam model used in the large-signal analysis of Sedin, resulted in gain and phase shift characteristics which are in good quantitative agreement with the adiabatic portion of both the Sedin and Gandhi-Rowe theories. Efficiencies approaching the theoretically predicted maximum were observed. By driving the amplifier to very large signal levels, a conversion efficiency for power available from the initial potential energy of the beam of 63 per cent was obtained with a corresponding value of 45 per cent for the total electronic efficiency. An important feature

of this experimental amplifier is the electron gun design which is based on a theory by Kino. That this gun is capable of producing a well-confined, rectilinear-flow thin beam is demonstrated by visual observations of the beam thickness which show that omega subscript c/omega subscript p is as low as 1.17, a value close to that for a laminar-flow Brillouin beam (omega subscript c = omega subscript p). (Author)

AD-264 218 repriced $1.00

Gulton Industries, Inc., Metuchen, N. J.
SILVER-CADMIUM BATTERIES, by Guy Rampel and R. C. Shair. Rept. on Contract AF 33(600)42397. June 61, 34p. 29 refs. WADD Technical rept. 61-131.

DESCRIPTORS: *Alkaline cells, Design, Military requirements, *Silver, *Cadmium, Storage batteries, *Silver compounds, *Oxides, Electrodes, *Silver electrodes, Preparation.

This report covers the first phase of a research and development program leading to improved, long life, reliable, high watt hour-per-pound, sealed silver-cadmium batteries. A comprehensive literature survey has been conducted. Included are all items of interest relative to previous development effort and their current capabilities. Data is given on special silver oxide-electrodes and comparison data on a commercial plate. Design recommendations for meeting the desired performance requirements are proposed and discussed. (Author)

PB 155 889 $1.10

Lincoln Lab., Mass. Inst. of Tech., Lexington.
AN AMPLIFIER FOR DRIVING ELECTROSTATIC TRANSDUCERS, by G. R. Curry. Rept. on Contract AF 19(604)7400. 11 Apr 61, 9p. Rept. 47G-0014; AD-254 953.

DESCRIPTORS: *Amplifiers, Transducers, *Electrostatic generators, Noise generators, *Electroacoustic transducers, Design, Power supplies, Measurement, Electronic circuits, Generators.

An amplifier for driving electrostatic transducers present an impedance that is largely capacitive. The amplifier is capable of driving a 6000 micromicrofarad captive load with 300 volts peak-to-peak at frequencies from 20 kc to 250 kc. The power supply employs a germanium bridge rectifier and is of conventional design. Measurements were made of the performance of a completed electrostatic transducer driver. The completed amplifier and power supply weight 68 pounds. The power requirement is 3.3 amperes at 115 volts AC. (Author)

PB 154 153 $15.50

Lincoln Lab. Mass. Inst. of Tech., Lexington.
PHASED ARRAY RADAR STUDIES, by J. L. Allen, L. Cartledge and others. Rept. 1 July 59-1 July 60, on Contract AF 19(604)5200. 12 Aug 60, 238p. 46 refs. Technical rept. no. 228; AD-249 470.

DESCRIPTORS: *Radar antennas, *Early warning radar, Radar equipment, Antenna radiation patterns, Microwave amplifiers, Phase shifters, *Radar transmitters, *Radar receivers, Data processing systems, Test equipment, Design, Mathematical analysis, Amplifiers, Antennas.

This effort consists of a continuing program of research and development in techniques and components applicable to a large class of phased array radar systems, with particular emphasis on arrays for long-range radar applications. The bulk of the present work of the project is devoted to technique and component development. A "first generation" of components was implemented for study of several possible receiving array techniques, e.g. (1) post-amplification multiple-beam formation and/or beam steering using direct digital control of phase shifters, (2) pre-amplification beam steering using digital phase shifters, and (3) pre-amplification multiple-beam forming. The data from the first generation of components are being applied to development of improved componentry and re-evaluation of the various array techniques. The results of preliminary studies of transmitter problems are reported, and the equipment implementation problem in this area is described. The past and present efforts on techniques and components are reported. The supporting studies of array theory and fundamentals are presented. (Author)

PB 155 891 $1.60

Lincoln Lab., Mass. Inst. of Tech., Lexington
A TUNNEL DIODE REFLEX MEMORY, by Kenneth E. Perry. Rept. on Contract AF 19(604)7400. 17 Apr 61, 13p. Rept. 52G-0018; AD-254 955.

DESCRIPTORS: *Diodes, *Transmission lines, *Delay lines, Memory devices, Design, Coaxial cables, *Electronic circuits, Circuits.

A normal delay line recirculating memory consists of a transmission line terminated at its output end by its characteristic impedance. A different arrangement is presented which we will call a reflex memory. It consists of a transmission line open-circuited at the output end but correctly terminated at the input end. A digital pulse will travel down the line and be reflected from the far end in the same polarity. It will then return to be absorbed by the input termination. A tunnel diode is inserted in series with the input terminating resistor. The average positive resistance of the diode should be considered in selecting the value of the terminating resistor. (Author)

AD-260 023 $3.60

Naval Ordnance Lab., Corona, Calif.
TEST PROCEDURES IN EVALUATION OF TELEMETRY SUBCARRIER DISCRIMINATORS, by K. L. Berns. 19 Apr 61, 31p. Technical memo. 73-56.

DESCRIPTORS: Test methods, Measurement, Instrumentation, Tests, Test equipment, Signal-to-noise ratio, *Discriminators, *Telemetering, Naval research laboratories, Scheduling, Packaging.

A standard test schedule is outlined and methods of measurement are described for the comparative evaluation of telemetry subcarrier discriminator performance. The schedule includes measurements to

determine the following discriminator performance characteristics: (1) linearity, (2) instability, (3) frequency response, (4) effect of noisy subcarrier signals, (5) effect of subcarrier amplitude modulation, (6) effect of line voltage variation, (7) effect of load variations, (8) input filter selectivity, (9) output distortion, (10) output noise, and (11) packaging and operational characteristics. (Author)

PB 181 082 $3.00

Naval Research Lab., Washington, D. C.
THERMOELECTRICITY, by J. W. Davisson, Joseph Pasternak, and B. B. Rosenbaum. Status rept. no. 7, July 61. 167p. NRL Memo. rept. 1177.

DESCRIPTORS: *Thermoelectricity, Materials, *Semiconductors, *Refractory materials, Gadolinium, Hafnium compounds, Rare earth elements, Pyrites, *Thermoelectric generators, Generators, Temperature, Heat, Energy.

Subjects discussed are: Thermoelectric materials development; thermoelectric materials for power conversion and power generation; high temperature properties of semiconductors; refractory gadolinium and hafnium compounds; rare earth chalcogenides; semiconducting compounds for thermoelectric power generation at high temperatures; structural investigations; semiconducting materials; chalcopyrites; oxide systems for thermoelectric power generation; preparation and properties; 5-KW thermoelectric generator; 500-watt thermoelectric generator; 500-watt portable thermoelectric generator; thermocouple energy converter; sandwich thermoelectric converter of solar energy; optimization of thermoelectric energy converters. (See also PB 171 691)

PB 155 811 $4.60

Naval Supersonic Lab., Mass. Inst. of Tech., Cambridge.
DESIGN AND CONSTRUCTION OF A PROTOTYPE TRAVELING-WAVE PUMP, by Eugene E. Covert and Charles W. Haldeman. Oct 60, 41p. 8 refs. Technical rept. 452; AD-254 261.

DESCRIPTORS: Supersonic wind tunnels, Design, *Magnetohydrodynamics, *Plasma physics, *Electric propulsion, Ion accelerators, Gas ionization, *Electromagnetic pumps, Power supplies, Mathematical analysis, Sources, Plasma jets.

An ionized gas can be accelerated by a moving magnetic field. This principle has been used to produce an electrodeless (A. C.) accelerator called a traveling-wave pump. Since high gas velocities are obtainable in this way, the device may be used directly for propulsion or for simulating re-entry flow conditions. The operating principle of the traveling wave pump is discussed. A prototype experimental facility of this type is described, and some performance data presented. The possible application to electrodeless power generation is also briefly mentioned. (Author)

PB 158 514 $19.75

Office of Scientific Research and Development. Div. 13.
ELECTRONIC NAVIGATION SYSTEMS. Summary technical rept. vol. 2B on Contracts OEMsr-1441 and OEMsr-1131. 1946, declassified 2 Aug 60, 349p. AD-221 600.

DESCRIPTORS: *Radar navigation, *Radar equipment, *Radio navigation, *Radio equipment, *Radar beacons, *Pulse transmitters, *Shoran, *Loran, *Plan position indicators, Mapping, *Ground position indicators, *Direction finding, Range finding, *Homing devices, Airborne, Plotters, *Search radar, *Air traffic control systems, Control systems, Television equipment.

Contents: Introduction; Beacons and interrogators; Oboe; Shoran; Micro-H; A.R.L. intermittent phase-comparison distance-measuring system; A.R.L. one-shot distance-measuring system; Canadian distance-measuring system; GE random interrogation distance-measuring system; GE time-rationing distance-measuring system; Gee; Loran; Decca navigational system (QM); Post-office position indicator (POPI); A-N radio "Range"; Aircraft direction-finders and homing systems; Sonne (Consol) (AN/FRN-5); Bendix automatic position-plotter; CAA VHF omnidirectional beacon; CAA LF omnidirectional beacon; Federal long-range navigational system; Airborne radar; Search radar as a navigational aid; AN/APN-34 short-range approach system; Federal airport traffic-control system; Map-PPI superposition (radar mapping); RCA television-radar system; Sperry omnidirectional-range and distance indicator; AN/APA-44 ground-position indicator (GPI); Miscellaneous enemy navigational systems; Comparisons, conclusions and recommendations; Appendix A - A short glossary of terms used in this report; Appendix B - Probable values of some physical and geodesic constants; List of microfilmed reports; Contract numbers; Service project numbers; and Index.

SCTM-145-61(14) $5.60

Sandia Corp., Albuquerque, N. Mex.
A QUALITATIVE STUDY ON AN EXPLODING WIRE FUSE, by W. D. LaCoss. Aug 61, 63p.

DP-642 $0.50

Savannah River Lab., Aiken, S. C.
CONTROL OF FATIGUE IN PHOTOMULTIPLIERS, by LeConte Cathey. Rept. on Contract AT(07-2)-1. Sep 61, 17p.

PB 155 928 $4.60

Technical U., Copenhagen (Denmark).
THE E-FIELD- AND H-FIELD-LOSSES AROUND ANTENNAS WITH A RADIAL GROUND WIRE SYSTEM, by Tove Larsen. Technical note no. 4 on Contract AF 61(052)319. Oct 60, 43p. 5 refs. AFCRL 176; AD-254 624.

DESCRIPTORS: Electric fields, Magnetic fields, *Antennas, Wire, *Communication systems.

The ratio between the E-field losses and the H-field losses and the absolute value of these losses around various antennas with radial ground wire systems were investigated. A number of curves showing the variation of these losses with the distance from the antenna base in different parameter cases were plotted. The antennas considered are vertical monopoles with sinusoidal current distribution and vertical monopoles the length of which is small as compared to the wavelength, with as well as without a top-loading. It was found that for the monopoles with sinusoidal current distribution the E-field losses are almost negligible as compared to the H-field losses. For the small monopoles, the E-field losses were large as compared to the H-field losses. The disk-loading on the small monopole was found to increase the E-field losses, but not to any great extent, the losses being mainly determined by the current distribution on the vertical member. (Author)

PB 155 927 $2.60

Technical U., Copenhagen (Denmark).
ECONOMICAL OPTIMUM DISTANCE BETWEEN WIRES OF A GROUND WIRE SYSTEM, by Tove Larsen. Technical note no. 6 on Contract AF 61(052)319. Nov 60, 28p. 5 refs. AFCRL 172; AD-254 623.

DESCRIPTORS: *Communication systems, Wire, Electric fields, Transmission lines, Costs, Design, Magnetic fields.

A theoretical and numerical investigation of the economical optimum distance between the wires of a ground wire system with parallel wires is described. The criterion for economical optimum is to minimize the sum of the annual costs for the wires and for the losses in the ground. E-field-losses as well as H-field-losses have been taken into account. (Author)

PB 155 926 $1.60

Technical U., Copenhagen (Denmark).
THE ELECTRIC FIELD AT THE GROUND PLANE NEAR A DISK-LOADED MONOPOLE, by Jesper Hansen and Tove Larsen. Technical note no. 5 on Contract AF 61(052)319. Nov 60, 19p. 5 refs. AFCRL 171; AD-254 622.

DESCRIPTORS: *Antennas, *Electric fields, *Antenna radiation patterns, Magnetic fields.

In calculating ground losses for antennas it is of importance to know the vertical electric field strength and the tangential magnetic field strength at the surface of the ground. The vertical electric field strength at the ground plane near the base of an electrically short vertical antenna with a top loading in the shape of a circular disk is calculated. Numerical computations are carried out to some extent. (Author)

PB 155 923 $1.60

Technical U., Copenhagen (Denmark).
NUMERICAL INVESTIGATION OF THE EQUIVALENT IMPEDANCE OF A WIRE GRID PARALLEL TO THE INTERFACE BETWEEN TWO MEDIA, by Tove Larsen. Technical note no. 3 on Contract AF 61(052)319. Aug 60, 19p. 3 refs. AFCRL 164; AD-254 621.

DESCRIPTORS: *Impedance, Electric wire, *Electromagnetic theory. *Transmission lines, Electromagnetic fields, Diffraction, Theory, Propagation, Wire, Electrical properties.

As an extension of a previous investigation on the theory of wire grids, formulas were given for the case of ground wire systems, namely a grid placed parallel to the interface between two media. Numerical computations are given of the equivalent grid impedance as a function of the dimensions of the grid and the parameters of the ground. The computations show that the approximation usually made in computations regarding ground wire systems, namely to use the grid impedance corresponding to perpendicular incidence, is justified when the wire system is placed in the ground, but that considerable errors may occur when the grid is placed above the ground surface. (Author)

PB 181 083 $2.50

Westinghouse Electric Corp., Pittsburgh, Pa.
SYNTHESIS AND PURIFICATION OF DIELECTRIC MATERIALS, by W. C. Divens, D. H. Hogle and others. Rept. for 1 July-31 Dec 60 on Applied Research on Dielectric Materials, Contract AF 33(616)5979. June 61, 110p. WADC Technical rept. 59-337, part III .

DESCRIPTORS: *Dielectrics, Dielectric films, Dielectric properties, *Aluminum compounds, *Oxides, *Boron compounds, *Nitrides, *Phosphides, Thin films, Synthesis, Purification, Electrical properties, *Capacitors, *Electric insulation, *Insulating compounds, Aluminum, Foils, Preparation, Electrodes.

The object of this research was to synthesize and purify inorganic dielectrics to achieve better dielectrics properties at high temperatures up to 500°C. The research program has concentrated particularly on boron nitride and aluminum oxide, with some work on several other materials. During the last year, effort has concentrated on preparing thin films of these materials and evaluating their dielectric properties at high temperature. Thin films of boron nitride and anodically formed alumina have been developed with quite satisfactory dielectric properties at 500°C. Work on arc plasma jet sprayed inorganic films starting with high purity materials has yielded only films with inferior dielectric properties, indicating contamination from the arc electrodes. (Author)

PB 158 898 $3.60

Westinghouse Electric Corp., Cheswick, Pa.
THE WESTINGHOUSE 5KW THERMOELECTRIC GENERATOR, by J. C. Kastovich, M. D. Fisher, and W. C. Moreland. Preliminary rept. on Contract NObs-77093. Aug 60, 31p. Rept. no. 9160-01102-903(1).

DESCRIPTORS: *Thermoelectric generators, Generators, Heat, Energy, *Electric power production, Thermoelectricity.

The design, fabrication, and testing of a high power, fossil-fuel fired thermoelectric generator is discussed. The history of development of the component systems is also summarized. Results of both

full scale generator testing and individual module testing is presented.

PB 158 899 $6.60

Westinghouse Electric Corp., Cheswick, Pa.
THE WESTINGHOUSE 5KW THERMOELECTRIC GENERATOR, by M. D. Fisher, J. C. Kastovich and W. C. Moreland. Final rept. on Contract NObs-77093. Mar 61, 65p.

DESCRIPTORS: *Thermoelectric generators, Generators, Heat, Energy, *Electric power production, Thermoelectricity.

The construction of this generator was an initial attempt at solving material selection, fabrication, assembly, operating and control problems of a large size thermoelectric generator. The prime goal in the development of the 5-kw generator was the rapid construction of an independent unit that would produce the required power, demonstrate the state of the art of thermoelectric devices, and indicate the feasibility of such a system. Although the system does not represent the ultimate goal of present research and development, it does provide a valuable source of data, information on the operating characteristics and performance of a basic power conversion system, and a facility for testing future thermoelectric material. (Author) (See also PB 158 898)

Ordnance, Missiles, and Satellite Vehicles

PB 155 626 $2.60

Air Crew Equipment Lab., Naval Air Material Center, Philadelphia, Pa.
DECOMPOSITION OF CARBON DIOXIDE WITH HIGH-ENERGY RADIATION, by William F. Bingham. Rept. on Program for Ecological Concepts for Air and Space Vehicles. 17 Feb 61, 28p. 27 refs. NAMC-ACEL-442; AD-253 463.

DESCRIPTORS: *Oxygen, Regeneration, Carbon dioxide, Solar energy, Recovery, *Photochemistry, Heat of formation, Photochemical reactions, *Space flight, Production, *Space capsules, Decomposition.

The purpose of this report is threefold. First, to summarize the theoretical photochemical aspects of decomposition and to calculate as precisely as possible the energies involved. Second, to calculate the normal surface area needed to absorb sufficient high-energy photons to keep one man supplied with a steady flow of respiratory oxygen. Third, to report the experimental results of workers in this field of research. CONCLUSIONS: The decomposition of carbon dioxide by solar radiation is considered impractical for use in a manned space vehicle. For complete recovery of O_2 from CO_2 using perfect catalysis a surface area of 2.088 x 10 to the 4th power sqm is indicated for one man. (Author)

PB 158 523 $16.50

Applied Mathematics Panel, Office of Scientific Research and Development.
ANALYTICAL STUDIES IN AERIAL WARFARE. Summary technical rept. vol. 2 on Contract OEMsr-1131. 1946, declassified 2 Aug 60. 253p. 347 refs; AD-221 605.

DESCRIPTORS: *Aerial gunnery, *Exterior ballistics, Deflection, Theory, *Pursuit courses, *Gun sights, *Gyroscopic sights, Sights, *Fire control systems, Airborne, Stabilization, *Fire control computers, Computers, *Fin stabilized ammunition, *Rockets, Airborne, Fire control, Aircraft, Damage control, *Antiaircraft fire control systems, *Aerial warfare, Warfare, Theory, Mathematical analysis.

Contents:
Analytical aspects of aerial gunnery: Aeroballistics; Deflection theory; Pursuit curves; Own-speed sights; Lead computing sights; Central station fire control; Analytical aspects of airborne experimental programs; New developments
Rocketry: Fire control for airborne rockets
Antiaircraft analysis: Studies of antiaircraft equipment; The risk to aircraft from high-explosive projectiles
General: Comments on a general theory of air warfare; Appendix A; Appendix B; Bibliography

AD-255 933 $5.60

Army Signal Missile Support Agency, White Sands Missile Range, N. Mex.
DORSETT TM-4-31 TELEMETRY TRANSMITTER SPECTRUM UTILIZATION, by William E. Castilo. 10 Apr 61, 55p. AFC rept. TM-10-4-61-T.

This report released by the cognizant military agency for sale to the public 27 Nov 61.

DESCRIPTORS: *Telemetering transmitters, Radio-frequency spectrum analyzers, Low frequency, Tests, Radio interference, Radio equipment, Radiofrequency, Guided missiles, Radio interference, Standing wave ratios, Frequency stabilizers, Telemeter systems.

Results of a laboratory investigation to determine the spectrum utilization of the Dorsett, model TM-4-31 telemetry transmitting package are given. These results were necessary to allocate frequencies on an interference free basis. Operational characteristics, such as frequency stability, power output, deviation and residual FM were empirically examined against the parameters of supply voltage variation and operating time. VSWR, spectrum analysis and interference characteristics (antenna conducted, case radiated and power line conducted) were also examined. (Author)

PB 155 311 $3.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
DATA GENERATION AND HANDLING FOR SCANNING DOPLOC SYSTEM, by Ralph E. A. Putnam. Dec 60, 33p. ARPA Satellite Fence Series rept. no. 20; BRL technical note no. 1367; AD-252 953.

DESCRIPTORS: *Satellite vehicles, *Tracking, *Doppler tracking, *Detection, Orbital flight paths, Illumination, Doppler systems, Data transmission systems, Radio signals, Reflection, Telephone lines, Teletype systems, Digital systems, Multiple operation, Magnetic recording systems, Memory devices, Electronic scanners, Antennas.

The DOPLOC system utilizers radio Doppler techniques for multiple target detection and tracking of dark satellites. It defines the orbit of a satellite within minutes following a single pass. System detection range is from 100 to 2000 miles. A proposed design is described wherein the sky is scanned periodically by a pair of sweeping fan-beam antennas suitably synchronized. It discusses all phases of the data generation and handling problem up to the point where presently established procedures are prepared to take over and compute orbital parameters. Data handling capabilities for an earth satellite population of 200 bodies are indicated with one general purpose computer. (Author)

PB 155 924 $1.10

Florence U. (Italy).
OBSERVATIONS ON THE SATELLITE 1960 EPSILON 1, by P. F. Checcacci. Technical note no. 4 on Contract AF 61(052)182. Sep 60, 5p. AFCRL 166; AD-254 923.

DESCRIPTORS: *Satellite vehicles, *Orbital flight paths, USSR, Satellite vehicle trajectories, Experimental data.

PB 155 925 $1.10

Florence U. (Italy).
OBSERVATIONS ON THE SATELLITES 1960 ETA 1 AND 1960 ETA 2, by Pier Francesco Checcacci. Technical note no. 5 on Contract AF 61(052)182. Sep 60, 3p. AFCRL-167; AD-254 924.

DESCRIPTORS: *Satellite vehicles, *Orbital flight paths, Satellite vehicle trajectories, Experimental data.

PB 155 264 $1.60

Frankford Arsenal, Philadelphia, Pa.
SMEAR COOLING OF 20mm AMMUNITION, by Eugene R. Vigelis. Oct 60, 16p. 3 refs. Rept. R-1580; AD-254 250.

DESCRIPTORS: *Ammunition, Automatic weapons, Hazards, Coolants, Heat production, Countermeasures, Guns.

An investigation was undertaken for determining the effect of smear-cooled 20mm ammunition upon M39 type gun temperatures with a view toward reducing the cook-off hazard. The results show that a considerable reduction of heat input to the gun can be realized through the use of silicone oil filled capsules in ammunition. (Author)

PB 155 292 $2.60

Frankford Arsenal, Philadelphia, Pa.
A STUDY IN THE APPLICATION OF TELEVISION TO OPTICAL RANGE FINDING TECHNIQUES, by Warren D. Hallermeier. Nov 60, 22p. 3 refs. Memo. rept. M61-12-1; AD-252 827.

DESCRIPTORS: *Television, *Range finding, Optical equipment, Tests, Target recognition, Tanks, Fire control systems, Detectors, Circuits.

A study was made (1) to determine the feasibility of a televisual range finder system, and (2) to ascertain the modifications which would be needed in present television equipment and optical range finders in order to develop a combined television and complex optical system. Target ranging via closed circuit TV is feasible where direct visual use of a range finder is prohibited by system configuration. It is recommended that a contrast enhancement study be started and that a system with improved light transmission and sentivity be investigated. The development of more practical and sophisticated electro-visual equipment to improve ranging should be initiated. (Author)

PB 155 467 $3.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
DOPPLER ANALYZER DISPLAY, by Dan R. Bromaghim, William H. Drury, and William F. Kelley. Rept. on Contract AF 19(604)7400. 7 Mar 61, 32p. Rept. 41G-0004; AD-253 514.

DESCRIPTORS: *Doppler tracking, *Doppler radar, Analysis, Display systems, *Radar tracking, Oscilloscopes, Data processing systems, Signal to noise ratio, *Electronic circuits, Radar equipment, Crystal filters, Design, Rockets, Tracking, Radiofrequency filters, Band-pass filters, *Radar signals, Pulse analyzers, *Radar images, Discriminators, *Rocket motors, Staging.

The doppler analyzer display equipment was developed for use in conjunction with the Millstone Hill data-processing system to solve a problem encountered while attempting to track one stage of a multi-stage rocket. The equipment provides a means of forcing the antenna to abandon the largest body in view and to track the desired stage. The raw IF signal is fed to a bank of narrow-band filters. Outputs of these filters are sampled sequentially and displayed across an oscilloscope in such a manner that the presentation resembles a histogram of target amplitudes versus frequency. In effect, the responsibility of deciding which filter contains the desired object has been taken from the data-processing equipment, and assigned to the DAD operator, resulting in a narrow (one filter-width) doppler gate for discrimination against undesired targets. An incidental benefit is a slight improvement in signal-to-noise when tracking at low signal-to-noise ratios. (Author)

PB 155 538 $1.60

Naval Ordnance Test Station, China Lake, Calif.
ASW WEAPON SIMULATION AT NOTS, by L. Z. Maudlin. Oct 60, 14p. NOTS TP-2552; AD-253 854.

DESCRIPTORS: *Antisubmarine ammunition, *Antisubmarine warfare, Test facilities, Simulation, *Underwater ordnance, Guidance, Control systems, Analog computers, Hydrodynamic laboratories, *Hydrodynamics, Torpedoes, Underwater ballistics.

The Hydrodynamic Simulator provides a constant laboratory environment in which antisubmarine weapons can experience the same forces and moments they would encounter in the water. The three-axis and four axis flight tables and their associated analog computers are described and their functions explained. (Author)

PB 155 475 $1.10

Naval Ordnance Test Station, China Lake, Calif.
NEAR FIELDS AND ORDNANCE HAZARDS, by Russell N. Skeeters. Jan 61, 10p. 6 refs. Technical article 10; NOTS TP-2543; AD-253 427.

DESCRIPTORS: *Antennas, Electromagnetic effects, *Electromagnetic fields, Radio-frequency, Electromagnetic waves, Hazards, Electric fields, Magnetic fields, Electromagnetic shielding, Radiation hazards, Ordnance, Explosives, Reduction, *Naval ordnance.

The electric and magnetic fields surrounding a vertical antenna are discussed. Information obtained on this subject is applied to the problems of reducing radiation hazards to ordnance. (Author)

PB 154 782 $2.60

Naval Ordnance Test Station, China Lake, Calif.
PENETRATION OF A ROD INTO A THICK ALUMINUM TARGET, by William A. Allen and James W. Rogers. 1 Dec 60, 27p. 17 refs. NOTS TP-2587; NAVWEPS-7597; AD-251 273.

DESCRIPTORS: *Metal plates, Penetration, Aluminum alloys, *Rods, Plasticity, Jets, *Terminal ballistics, Elasticity, Theory, Shaped charges, Hydrodynamics, Projectiles, Velocity.

The penetration of metal rods into semi-infinite metal targets has been investigated experimentally at velocities up to 0.3 cm/microsecond. The rods were composed of Au, Pb, Cu, Sn, Al, and Mg; the target was Al. Results are compared with predictions from the hydrodynamic theory of jet penetration. The elementary hydrodynamic theory does not hold in the velocity range studied, but the modified theory is shown to be generally acceptable except where the density of the jet is much greater than that of the target. A gold jet penetrating an Al target, for example, reveals a new effect of secondary penetration which results in penetration greater than that predicted by theory. Crater volumes produced by impact were found to be roughly proportional to the initial kinetic energy of the jet. (Author)

PB 155 727 $7.60

Naval Weapons Lab., Dahlgren, Va.
REVIEW OF EXTERIOR BALLISTIC DATA FOR THE 3"/50 GUN WEAPONS SYSTEMS, by W. A. Kemper. 5 Apr 61, 73p. 14 refs. NWL rept. 1746; AD-254 437.

DESCRIPTORS: Shipborne, Projectile fuzes, Base detonating fuzes, Projectile trajectories, *Range tables, *Exterior ballistics, Errors, *Fire control systems, *Naval guns, Gunnery, *Antiaircraft guns, *Armor piercing ammunition, *Antiaircraft ammunition, Tracers (Ordnance), Least squares method, Projectile windshields, Proximity fuzes, *High capacity projectiles, *Projectiles, Ballistics, Plastics, Fuzes, Corrections, Guns.

Based on Naval Weapons Laboratory firing programs 1944-1956 a new method of least squares averaging absolute and relative results was used to obtain estimates of ballistic coefficients. Plastic windshields may be deforming or breaking. Corrections to the ballistic data used in fire control systems are given. A method for the shipboard measurement of jump is proposed. (Author)

PB 158 506 $21.00

Office of Scientific Research and Development. Div. 5.
GUIDED MISSILES AND TECHNIQUES. Summary technical rept. vol. 1 on Contract OEMsr-1131. 1946, declassified 17 July 58, 382p. 156 refs. AD-200 781.

DESCRIPTORS: *Guided missiles, Design, Television equipment, Radio equipment, Control systems, Servomechanisms, Servo systems, Aerodynamics, *Glide bombs, Bombs, Electronic simulators, Bolometers, Photoelectric target seekers.

Contents:
Guided-missile systems: Glide bombs; Azon and razon; Felix and dove eye; Roc and its controls
Components and accessory activities: Television; Radio control systems; Servomechanisms; Instrumentation; Miscellaneous control systems; Simulation; Transition and engineering activities
Contributions from individual investigators: Some aspects of the design of homing aero-missiles; The design of high-angle dirigible bombs; Project Roc in retrospect
Appendix: Interception and escape techniques at high speed and altitude; Lateral stability of homing glide bombs with application by Navy SWOD Mark 7 and Mark 9; Infrared radiation and its application to homing missiles; Glossary; Bibliography

PB 158 504 $23.50

Office of Scientific Research and Development, Div. 4.
RADIO PROXIMITY FUZES FOR FIN-STABILIZED MISSILES. Summary technical rept. vol. 1 on Contract OEMsr-1131. 1946, declassified 2 Aug 60, 487p. 560 refs; AD-221 588.

DESCRIPTORS: *Fin-stabilized ammunition, Rockets, *Radio proximity fuzes, Fuzes, Military requirements, Design, Production, Classification, Operation, Test methods, Tests, *Antennas, Impedance, Antenna radiation patterns, Electronic equipment, *Control systems, Radiofrequency, *Amplifiers, *Oscillators, Detonators, Circuits, Power supplies.

Contents:
The radiation interaction system
Electronic control systems
Mechanical design
Catalogue of fuze types
Production
Laboratory testing of fuzes
Field testing of proximity fuzes
Analysis of performance
Glossary
Bibliography

PB 158 520 $19.75

Office of Scientific Research and Development. Div. 6.
A SURVEY OF SUBSURFACE WARFARE IN WORLD WAR II. Summary technical rept. vol. 1 on Contract OEMsr-1131. 1946, downgraded 17 July 58, declassified 2 Aug 60. 337p. 64 refs; AD-221 607.

DESCRIPTORS: *Antisubmarine warfare, Warfare, Organization, *Operations research, Military research, *Underwater sound, *Transducers, Calibration, *Torpedoes, *Fluid mechanics, *Underwater ordnance detectors, Airborne, Detectors, *Sonar, Training, Maintenance, *Submarine noise, Reduction, *Acoustic torpedoes, Submarines.

Contents:
Organization and activities of Division 6: The antisubmarine problem; Scope of division activities; Organization of the subsurface warfare group
Operations research: The role of operations research in antisubmarine warfare; NDRC background; Development of U. S. operations research; Research activities
Physical research: Fundamental studies of underwater sound; Transducer research and calibration; Torpedoes and fluid dynamics
Equipment development: Antisubmarine detection equipment; Prosubmarine equipment; Acoustic torpedoes
Training and maintenance: Assistance to the Navy in technical training; Field engineering; Appendix A-I Bibliography

SC-2992(TR) $0.75

Sandia Corp., Albuquerque, N. Mex.
STEP-FUNCTION APPROXIMATION OF CONTINUOUS CASUALTY FUNCTIONS. Sep 61, 28p.

Sanitation and Safety Engineering

APEX-715 $0.50

General Electric Co., Cincinnati, Ohio.
AIRCRAFT NUCLEAR PROPULSION DEPARTMENT NUCLEAR SAFETY GUIDE, by William A. Pryor. Rept. on Contracts AF 33(600)-38062 and AT(11-1)-171. June 61, 27p.

HW-68929 $1.25

Hanford Atomic Products Operation, Richland, Wash.
NUCLEAR SAFETY IN CHEMICAL AND METALLURGICAL PROCESSING OF PLUTONIUM, by E. D. Clayton. Rept. on Contract AT(45-1)-1350. Apr 61, 44p.

OTS SB-469 $0.10

Office of Technical Services, Dept. of Commerce, Washington, D. C.
PROTECTIVE SHELTERS. July 61, 11p. 116 refs. OTS Selective Bibliography SB-469.

DESCRIPTORS: Air raid shelters, Biological warfare agents, Chemical warfare agents, Blast, Exposure, Radioactivity, Thermal radiation, Countermeasures, Safety, *Protective shelters, Shelters, Civil defense systems, Bibliography.

Lists 116 PB reports, translations, and AEC reports on protective shelters available in the OTS collection. Some of the reports have been specifically prepared for civil defense planning. Includes reports on the following types of shelters: Air raid, Biological warfare, Blast resistant, Bombproof, Chemical warfare, Cold weather, Hot weather, Nuclear radiation, Thermal radiation.

Ship Building

PB 155 654 $2.60

David Taylor Model Basin, Washington, D. C.
RESISTANCE AND PROPULSION CHARACTERISTICS FOR LCU 1466 AS REPRESENTED BY MODEL 4545, by A. L. Beal and W. B. Hinterthan, Mar 61, 30p. 3 refs. rept. no. 1037; AD-254 123

DESCRIPTORS: *Landing craft, Model tests, Ship models, Resistance, Marine propellers, Propulsion, Marine rudders, Effectiveness, Amphibious operations, Shrouded propellers.

Resistance and propulsion studies were conducted on Model 4545 representing the Utility Landing Craft, LCU Class, to make the ship suitable for high-speed amphibious assault operation. A significant increase in the free-route speed through the use of TMB-designed Kort nozzles was accomplished without changing the basic hull or affecting its beaching characteristics. Tests were run first with the original ship appendages, and then with faired side skegs and Kort nozzles added Test results showed that the skegs and nozzles were necessary for increased performance. (Author)

PB 155 317 $8.60

Naval Weapons Lab., Dahlgren, Va.
DERIVATION OF MATHEMATICAL SHIP SHAPES FROM THE TAYLOR STANDARD SERIES, by A. V. Hershey. 15 Feb 61, 94p. 6 refs. NWL rept. no. 1737; AD-252 979.

DESCRIPTORS: *Ships, *Ship hulls, Ship models, Least squares method, *Programming, Polynomials, Configuration.

A complete set of computing programs was prepared for the least squares smoothing of offset data and for the plotting of section lines on a CRT printer. These were used to develop a parent form from the Taylor Standard Series of hull forms. Computing programs were prepared for constructing derived forms in accordance with specifications and for computing polynomial approximations of the derived forms. The parametric method was used in the mathematical approximation of the surface of the ship. This method frees the formulation from singularities at the keel of a flat-bottomed ship, provided there is an adequate distribution of offset data. (Author)

FOOD, HANDLING, AND PACKAGING EQUIPMENT

Food

PB 158 902 $6.60

Armour and Co., Chicago, Ill.
DEVELOPMENT OF IRRADIATED RATION TYPE MEAT ITEMS, by H. P. Furgal, L. A. Harriman, and F. J. Alexander. Rept. no. 7 (Final) 29 Oct 57-28 Jan 59, on Contract DA 19-129-qm-1049. [1959] 66p. S-571; AD-227 911.

DESCRIPTORS: *Meat, *Radiation effects, Military rations, Beef, Pork, Chickens, Gamma rays, Heating, Food.

Beef, pork, and chicken products were prepared in gravy and BBQ sauce. Several processing variations, primarily on beef in saline, were also included. The irradiation levels which were used ranged from 1.5 to 5.0 Mrad. Products were evaluated immediately following irradiation and after 3 and/or 6 mo storage at 70-75°F. Some of the products were found initially acceptable as to flavor, 3 Mrad was generally preferred over 5 Mrad irradiation. Some of them were stable or improved in flavor during storage. All of the stored samples were free of bacteriological spoilage. The use of BBQ sauce produced the best items. (Author)

PB 158 904 $13.50

Massachusetts Inst. of Tech., Cambridge.
STUDIES OF THE FUNDAMENTAL PHYSICAL AND BIOLOGICAL CHANGES THAT OCCUR AS A RESULT OF RADIATION TREATMENT OF FOODS RESULTING IN MODIFICATIONS OF FLAVOR, COLOR AND TEXTURE, by B. E. Proctor, S. A. Goldblith and others. Rept. no. 11 (Final) 1 Sep 55-20 Apr 57, on Contract DA 19-129-qm-522. [1957] 194p. 59 refs. File no. S-501; AD-202 663.

DESCRIPTORS: *Food, *Milk, *Radiation effects, *Peptides, *Oleic acids, Isomeric transitions.

Results are presented of studies on off-flavor formation and of chemical changes in milk and milk components on irradiation; studies on the trans-isomerization of oleic acid upon irradiation; and action of ionizing radiations on dipeptides.

PB 158 901 $2.60

Nuclear Science and Engineering Corp., Pittsburgh, Pa.
DEVELOPMENT OF AN ASSAY FOR PROTEOLYTIC ENZYME ACTIVITIES IN IRRADIATED MEATS AND APPLICATION OF THE ASSAY IN HEAT/RADIATION ENZYME INACTIVATION STUDIES, by Abraham Edelmann, M. S. Glitzer and others. Rept. no. 3 (Final), 10 June 58-9 Sep 59, on Contract DA 19-129-qm-1211. [1959] 25p. 11 refs. File no. S-581; AD-239 613.

DESCRIPTORS: *Enzymes, *Meat, *Radiation effects, Inhibition, Papain, *Proteases.

From previous work it had been conclusively demonstrated that crude papain extract, tryptic enzymes and highly purified spleen cathepsin C were capable of producing anilide crystal separation and transamidation. Studies in this laboratory demonstrated that papain would produce the anilide. Therefore, the possibility of this reaction being driven by crude meat cathepsins appeared feasible. After preliminary standardization of the enzyme preparation and assay, procedures were delineated and studies were performed to insure the purity and determine the solubility of the substrate compounds. Numerous studies were performed in an attempt to obtain the anilide.

PB 158 900

Southern Research Inst., Birmingham, Ala.
DETERMINING THE FUNCTIONAL PROPERTIES OF FOOD CONTAINERS USED FOR FOOD IRRADIATED IN COMBINATION WITH MODEL FOOD SYSTEMS, by Charles E. Feazel, Bobby C. Moses and others. Rept. no. 20 (Final) 25 Sep 56-24 Mar 58, on Contract DA 19-129-qm-759. 24 Apr 58, 138p. 7 refs. File no. S-554.

DESCRIPTORS: *Food, Containers, *Radiation effects, Preservation, Plastics, *Packaging.

The object of this investigation on the radiation preservation of foods was to study the interaction between plastic packages and model foods when they were irradiated together. Water solutions of sodium chloride, acetic acid, and sucrose presented relatively few difficulties and could be packaged in Scotchpak and several other combinations of polyethylene. Methionine solution was a little more difficult, but was successfully packaged in polyethylene-cellophane. Salad oil and 5% lactic acid solution were the most difficult and could be held only in Scotchpak and a laminate of polyethylene-aluminum-Mylar-polyethylene. Radiation caused fragmentation of polymer molecules so that extractable materials were produced in amounts estimated to be possibly as high as 4% by weight of the film. Odoriferous compounds were also released by irradiation. (Author)

PB 158 903 $1.60

Takamine Lab., Clifton, N. J.
STUDY OF ENZYME SOURCES FOR NATURAL FLAVOR ENHANCEMENT OF PROCESSED FOODS, by R. R. Barton. Rept no. 9 (Final) 15 Jan 58-14 July 59, on Contract DA 19-129-cm-1094. [1959] 11p. 11 refs. File no. D-323; AD-237 518.

DESCRIPTORS: *Enzymes; Sources, *Food, Processing, Acceptability, Bacteria, Fungi, Vegetables.

A procedure involving aqueous extraction and acetone precipitation has been developed for obtaining enzyme(s) from legumes, especially blackeye beans, which enhance flavor in processed legume products. Qualitative evaluation by organoleptic tests and quantitative evaluation based on determination of carbonyl content of treated legumes has been made. The enzyme catalyzes oxidative reaction, and a source of oxygen as well as enzyme must be supplied. The enzyme is most effective in the range pH5.0-6.5 at temperatures of 25° -30°C., and is rapidly inactivated at 40°C. (Author)

MACHINERY, FABRICATION, AND ACCESSORY EQUIPMENT

NAA-SR-MEMO-6539 $1.60

Atomics International, Canoga Park, Calif.
DESIGN OF CYLINDRICAL EDDY-CURRENT BRAKE, by R. S. Baker. June 61, 16p.

MATERIALS

PB 154 834 $2.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
REACTIONS OF DECABORANE WITH CELLULOSE AND CELLULOSE DERIVATIVES, by Stanley Semel, Yvon P. Carignan, and Frank J. Masuelli. Dec 60, 27p. Technical notes no. FRL-TN-16; AD-253 153.

DESCRIPTORS: *Decaboranes, Cellulose, *Solid rocket propellants, *Specific impulse, X-ray diffraction analysis, Infrared spectroscopy, Chemical bonds, Production, Binders, Nitrocellulose, Rocket fuels, Storage, Stability, Propellants, Fuels.

Decaborane was incorporated into both a single-base and a double-base matrix. The short term heat stability of the single-base decaborane mixture was satisfactory. However, preliminary shelf life study appeared to indicate that within a month some physical changes had occurred. Double-base decaborane mixtures did not pass the standard heat test. Adduct formation between decaborane and some cellulose derivatives was attempted. The presence of a swelling agent such as hydrazine or ethylene diamine gave a product containing substantial quantities of decaborane. When nitrocellulose was pretreated with ethylene diamine and then with decaborane a product containing 10.0% boron was obtained. Data is presented on the infrared-spectra, X-ray diffraction and microscopical studies of the various cellulose-decarborane derivatives. It was concluded that the use of decaborane in double-base formulation is not promising. (Author)

APEX-624 $2.00

General Electric Co., Cincinnati, Ohio.
INVESTIGATION OF POSSIBLE BEARING MATERIALS AND LUBRICANTS FOR TEMPERATURES ABOVE 1000°F, by M. B. Peterson and S. F. Murray. Rept. on Contracts AF33(600)-38062 and AT(11-1)-171. Apr 59, 76p.

MLM-1115 $1.60

Mound Lab., Miamisburg, Ohio.
MOUND LABORATORY MONTHLY PROGRESS REPORT FOR MAY 1961, by J. F. Eichelberger. Rept. on Contract AT(33-1)-GEN-53. Sep 61, 19p.

Ceramics and Refractories

NAA-SR-6473 $0.50

Atomics International, Canoga Park, Calif.
THE EFFECT OF POROSITY ON THE THERMAL CONDUCTIVITY OF ALUMINA, by J. D. McClelland and L. O. Petersen. Rept. on Contract AT(11-1)-GEN-8. Oct 61, 13p.

NAA-SR-6454 $0.50

Atomics International, Canoga Park, Calif.
FABRICATION AND PROPERTIES OF TRANSLUCENT BERYLLIUM OXIDE, by J. D. McClelland, J. H. Richardson and L. R. Franklin. Rept. on Contract AT(11-1)-GEN-8. [1961] 16p.

NAA-SR-6441 $0.50

Atomics International, Canoga Park, Calif.
RESEARCH HOT PRESSING, by J. D. McClelland and W. M. Smith. Rept. on Contract AT(11-1)-GEN-8. Oct 61, 18p.

ORO-476 $1.10

Carborundum Co., Niagara Falls, N. Y.
SYNTHESIS AND FABRICATION OF REFRACTORY URANIUM COMPOUNDS. Monthly progress rept. no. 4, 1 July-31 July 61, on Contract AT(40-1)-2558. 4p.

APEX-625 $2.00

General Electric Co., Cincinnati, Ohio.
FRICTION AND WEAR OF REFRACTORY COMPOUNDS, by K. P. Zeman, W. R. Young, and L. F. Coffin, Jr. Rept. on Contracts AF33(600)-38062 and AT(11-1)-171. May 59, 81p.

APEX-669 $0.50

General Electric Co., Cincinnati, Ohio.
STRESSES IN HEXAGONAL TUBES, by H. J. Kurtz and F. E. Wells. Rept. on Contracts AF 33(600)-38062 and AT(11-1)-171. Aug 61, 12p.

MATHEMATICS

APEX-706 $2.75

General Electric Co., Cincinnati, Ohio.
FLEXIBLE MONTE CARLO PROGRAMS FMC-N AND FMC-G, by J. J. Loechler and J. E. MacDonald. Rept. on Contracts AF 33(600)-38062 and AT(11-1)-171. Apr 61, 174p.

APEX-635 $2.25

General Electric Co., Cincinnati, Ohio.
THE STATISTICAL EVALUATION OF RANDOM NUMBER GENERATING SEQUENCES FOR DIGITAL COMPUTERS, by R. G. Herrmann. Rept. on Contracts AF 33(600)-38062 and AT(11-1)-171. July 61, 101p.

APEX-632 $0.75

General Electric Co., Cincinnati, Ohio.
SUBROUTINE FOR SYSTEMATIC SAMPLING OF THREE CARTESIAN COORDINATES AND AN ENERGY VALUE, by J. L. McGurn and J. R. Beeler. Rept. on Contracts AF33(600)-38062 and AT(11-1)-171. Dec 58, 28p.

PB 157 363 $3.60

Institute of Mathematical Sciences, New York U., N. Y.
A QUEUEING PROCESS WITH AN ABSORBING STATE, by W. M. Hirsch, J. Conn, and C. Siegel. Rept. on Contract Nonr-285(38). Sep 60, 34p. 7 refs. IMM-NYU-276; AD-244 214.

DESCRIPTORS: *Military operations, Warfare, Guided missiles, Vulnerability, Aircraft, Statistical analysis, Statistical processes, Games theory, Simulation.

A queueing process encountered in the course of a military study is considered. The following situation is discussed: A missile battery is defending itself against a train of hostile aircraft. Each attacking plane has perfect accuracy and will destroy the battery if it gets within a certain critical range. Think of the file of aircraft as a queue which is moving toward an objective 0 and of the battery as a server who attempts to perform some operation on each element in the queue before that element reaches 0. When a member of the queue is served successfully, the server retracts instantly to the next one in line. If an element in the queue reaches 0 without having previously been served, the server is permanently and totally disabled. Time is treated as a discrete variable. (Author)

KAPL-M-EC-4 $3.60

Knolls Atomic Power Lab., Schenectady, N. Y.
DAPR I DATA PROCESSING AND REDUCTION ON THE PHILCO S-2000 DIGITAL COMPUTER, by L. E. Weyrick. Rept. on Contract W-31-109-eng-52. Dec 60, 31p.

KAPL-M-NPA-23 $10.10

Knolls Atomic Power Lab., Schenectady, N. Y.
PRESSURIZER ANALYSIS AND THE PRE DIGITAL PROGRAM, by J. A. Findlay. Rept. on Contract W-31-109-eng-52. July 61, 120p.

KAPL-M-EC-8 $3.60

Knolls Atomic Power Lab., Schenectady, N. Y.
VEP - EIGENVALUE VIBRATION PROGRAM, by J. A. Warrington and R. B. McCalley. Rept. on Contract W-30-109-eng-52. Feb 61, 34p.

PB 155 893 $7.60

Michigan U. Coll. of Literature, Science, and the Arts, Ann Arbor.
NILPOTENT LIE ALGEBRAS, by Chong-Yun Chao. Doctoral thesis. Technical note on Contract AF 49(638) 104. Mar 61, 73p. 22 refs. 03000-2-T; AFOSR 292; AD-254 969.

DESCRIPTORS: *Algebras, Classification.

The purpose is to study nilpotent Lie algebras over the real number field, and the main results center around two problems; (1) the problem of classification, and (2) the problem of faithful representation. The Levi-Whitehead's decomposition theorem states that an arbitrary Lie algebra can be decomposed into a semi-direct sum of semisimple sub-algebra and the radical (maximum solvable ideal). As far as classification is concerned, the classification of the semisimple Lie algebras has been completely done. The classification of solvable Lie algebras has been reduced to the classification of nilpotent ones. We make some contributions to the classification of nilpotent Lie algebras of length 2, and nilpotent Lie algebras of low dimensions. Improving a result of Malcev we show the existence of uncountably many nonisomorphic nilpotent Lie algebras of any given dimension equal to or greater than 10. We construct all nilpotent Lie algebras of dimension equal to or less than 5 re-establishing Dixmier's results by slightly different methods. We also establish some relationship among the length, index, and dimension of nilpotent Lie algebras. (Author)

PB 155 640 $2.60

Naval Weapons Lab., Dahlgren, Va.
GENERAL LINEAR APPROXIMATIONS AND GENERALIZED FINITE DIFFERENCES, by E. W. Schwiderski. 28 Feb 61, 22p. 5 refs. NWL rept. no. 1739; AD-253 904.

DESCRIPTORS: *Numerical analysis, Differential equations, Polynomials, Taylor's series.

The present paper utilizes general linear forms of selected base functions for the central problem in numerical analysis, i.e., the problem of approximating complicated functions. As in ordinary polynomial approximations, adaptable linear parameters are subject to appropriate numerically discrete information about the primitive function, while adaptable approximating base functions employ appropriate information about the analytic continuum. Based on the Taylor and the Newton-Lagrange numerical approximation principles, general and special formulae are derived and displayed together with their corresponding error terms. The concept of ordinary finite differences is generalized on the grounds of the previously introduced general linear approximations. Applications to initial and boundary value problems of ordinary differential equations are illustrated and compared with ordinary methods. (Author)

SCR-422 $1.60

Sandia Corp., Albuquerque, N. Mex.
A PROGRAM FOR CALCULATING HYPERGEOMETRIC PROBABILITY DISTRIBUTION TABLES ON THE IBM 704 EDPM, by M. Katherine Weston. Aug 61, 21p.

NYO-2678 $9.10

Technical Research Group, Syosset, N. Y.
HETEROGENEOUS REACTOR CALCULATION METHODS, by Carl N. Klahr, Lawrence B. Mendelsohn and Jerome Heitner. Quarterly progress rept. no. 6, 1 July-30 Sep 60 on Contract AT(30-1)-2375. 108p. TRG-129-QTR-6.

NYO-2679 $8.60

Technical Research Group, Syosset, N. Y.
HETEROGENEOUS REACTOR CALCULATION METHODS, by Carl N. Klahr, Lawrence B. Mendelsohn and Jerome Heitner. Quarterly progress rept. no. 7, 1 Oct-31 Dec 60, on Contract AT(30-1)-2375. 102p. TRG-129-QTR-7.

AD-262 841 $10.10

Virginia U., Charlottesville.
DIFFERENTIABLE PERIODIC MAPS, by P. E. Conner and E. E. Floyd. Technical note no. 23 on Topology and Mathematical Analysis, Contract AF 49(638)72. [1961] 122p. 27 refs. AFOSR-1016.

DESCRIPTORS: *Topology, Algebraic topology, *Mathematical analysis, Theory, Functions, Groups (Mathematics), Numbers.

Fibre bundles are classified into cobordism groups by means of differential manifolds. Clearly defined differentiable periodic maps are presented. Fixed-point free involutions are applied to specific cases. An appendix describes a different approach to the subject.

Computing Devices

APEX-665 $1.00

General Electric Co., Cincinnati, Ohio.
ANP PROGRAM NO. 700, FANTASIA, by J. A. Delaney. Status rept. on Contracts AF33(600)-38062 and AT(11-1)-171. Apr 61, 39p.

APEX-643 $1.00

General Electric Co., Cincinnati, Ohio.
COMPARATIVE STUDY OF FREE AND VAST VIBRATION ANALYSIS AND COMPUTER PROGRAMS, by John Wallach. Rept. on Contracts AF 33(600)-38062 and AT(11-1)-171. June 61, 41p.

APEX-661 $3.00

General Electric Co., Cincinnati, Ohio.
COMPRESSIBLE FLOW NETWORK COMPUTER PROGRAM (ANP 622), by S. C. Skirvin. Rept. on Contract AF33(600)-38062 and AT(11-1)-171. July 61, 240p.

APEX-609 $1.75

General Electric Co., Cincinnati, Ohio.
CONVERSION OF PROGRAM F-N TO THE IBM-7090 (ANP PROGRAM NUMBER 308), by F. D. Wenstrup. Rept. on Contracts AF33(600)-38062 and AT(11-1)-171. May 61, 70p.

APEX-708 $4.00

General Electric Co., Cincinnati, Ohio.
IBM-7090 PROGRAMS TO COMPILE AND MODIFY A NUCLEAR DATA TAPE, by R. G. Herrmann, T. A. Hoffman and others. Rept. on Contracts AF33(600)-38062 and AT(11-1)-171. May 61, 304p.

APEX-662 $1.00

General Electric Co., Cincinnati, Ohio.
INCOMPRESSIBLE FLOW NETWORK SUBROUTINE FLONET, ANP PROGRAM NO. 604, by J. A. Delaney. Rept. on Contracts AF33(600)-38062 and AT(11-1)-171. Apr 61, 39p.

APEX-709 $4.50

General Electric Co., Cincinnati, Ohio.
TWENTY-FIVE GROUP REACTOR NUCLEAR DATA TAPE NEUTRON CROSS SECTIONS, by J. W. Zwick and T. J. Kostigen. Rept. on Contracts AF33(600)-38062 and AT(11-1)-171. June 61, 376p.

KAPL-M-JA-7(Rev.1&2) $1.60

Knolls Atomic Power Lab., Schenectady, N. Y.
KARE GENERAL MESH DATA, by J. A. Archibald, Jr. Rept. on Contract W-31-109-eng-52. May 60, 16p.

KAPL-M-JA-6(REV. III) $7.60

Knolls Atomic Power Lab., Schenectady, N. Y.
KARE INPUT, by J. A. Archibald, Jr. Rept. on Contract W-31-109-eng-52. June 61, 91p.

UCRL-6510 $0.75

Lawrence Radiation Lab., U. of California, Livermore.
SYSTEM OF AUTOMATIC PROCESSING AND INDEXING OF REPORTS, by Lester Douglas Turner and James Henry Kennedy. Rept. on Contract W-7405-eng-48. July 61, 32p.

PB 155 291 $1.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
MACHINE PROCESSING OF LINE DRAWINGS, by Lou Hodes. Rept. on Contract AF 19(604)7400. 7 Mar 61, 15p. Rept. 54G-0028; AD-252 850

DESCRIPTORS: *Data processing systems, Pictures, *Programming, Digital computers, Algebra.

This paper describes a method for mechanically processing line patterns. The method is really a series of programs. Section 2 covers the entire system, while the programs are described in Section 3-5. Possible applications are considered in Section 6. Section 7 is a note on the so-called topological properties of line drawings. Much power and elegance are derived from use of the LISP programming system. Familiarity with LISP is not necessary for reading this report except for the programs themselves in Section 8. (Author)

PB 156 078 $1.60

National Bureau of Standards, Washington, D. C.
HINDSIGHT IN PREDICTIVE SYNTACTIC ANALYSIS, by I. Rhodes. 30 Nov 60, 16p. NBS rept. 7034; OOR rept. 2165:4-M; AD-252 659

DESCRIPTORS: *Machine translation, Computer, Language, USSR, Automatic.

Aspects of a system of automatic language translation are discussed. A hindsight consists of a hindsight entry (HE) and possibly one or more hindsight resolutions (HR). An HE is a piece of information recorded in the machine's memory at the time a syntactic grammatical problem first arises. All HE's are examined at several points during the processing of each subsequent string. An HR is information recorded alongside HE whenever a subsequent occurrence in the same sentence sheds partial light on a particular HE. Whenever an occurrence resolves a difficulty the HE is erased.

MECHANICS

PB 158 522 $16.50

Applied Mathematics Panel, Office of Scientific Research and Development.
MATHEMATICAL STUDIES RELATING TO MILITARY PHYSICAL RESEARCH. Summary technical rept. vol. 1 on Contract OEMsr-1131. 1946, 260p. 248 refs; AD-221 604.

DESCRIPTORS: *Applied mathematics, *Military research, *Fluid mechanics, Shock waves, Theory, *Underwater explosions, *Hydrodynamics, Metals, *Wave transmission, *Electronics, Underwater sound, *Acoustics, *Electromagnetic waves, Electromagnetic theory, *Light, Diffraction, Spheres, Reflection, *Coils, *Dipole moments, Particles, *Mechanics, *Continuum mechanics, *Underwater ballistics, Ballistics, Impact shock, Cavitation.

Contents:
Fluid dynamics and related problems: Gas dynamics - Shock wave theory; Underwater explosions and hydrodynamic investigations
Wave propagation and electronics: Wave transmission through metal shells; The scattering cross section of spheres for electromagnetic waves; Coils yielding a single dipole moment
Mechanics: Mechanics of particles and rigid bodies; Mechanics of a continuum
Underwater ballistics: Descriptive summary; Impact forces; The cavity; Underwater trajectories; Modeling and scale effects

PB 155 582 $2.60

Guggenheim Aeronautical Lab., Calif. Inst. of Tech., Pasadena.
COMBINED STRESSES IN AN ORTHOTROPIC PLATE HAVING A FINITE CRACK, by D. D. Ang and M. L. Williams. Rept. for June 58-Dec 60 on Mechanics of Flight, Contract AF 33(616)5740. July 61, 27p. 13 refs. ARL-22.

DESCRIPTORS: Sheets, *Fracture (Mechanics), Mathematical analysis, Integral equations, Stresses, Shear stresses, Load distribution.

Using a formulation in integral equations, a solution for the combined extension-classical bending stress and displacement solution is presented for the case of an infinite orthotropic flat plate containing a finite crack. While the solution can be expressed in closed form for the entire field, primary emphasis is placed upon the stresses near the crack point. Qualitatively no major difference in behavior due to orthotropy was found although certain quantitative features are noted, mainly as a function of the characteristic rigidity ration $(E_x/E_y)^{1/2}$. The inverse square root character of the isotropic stress bending and extension is not changed by orthotropy, although amplitudes and distribution are affected. Account is taken of recent work of Knowles and Wang dealing with Reissner bending of the plate in deriving a bending-extension interaction curve for fracture initiation. The interaction is linear if an octahedral shearing stress criterion is used. (Author)

Aerodynamics and Pneumatics

PB 155 310 $2.60

Avco-Everett Research Lab., Mass.
STEADY MAGNETOHYDRODYNAMIC FLOW THROUGH A CHANNEL OF CIRCULAR SECTION, by Frank Fishman. Rept. on Contract AF 04(647)278, Dec 60, 21p. 1 ref. Research rept. 97; AFBMD TR-61-13; AD-250 314.

DESCRIPTORS: *Magnetohydrodynamics, Cylindrical bodies, Electrodes, Theory, Magnetic fields, *Electrical effects.

The electrical effects of a magnetohydrodynamic flow through a channel of circular section with electrodes are investigated theoretically. Attention is restricted to channels many diameters long; hence, it is assumed that the flow velocity is uniform and parallel to the channel axis and the magnetic field is the applied field, taken to be uniform and normal to the channel axis. The current density is computed for this flow, and this result is used to calculate the net current flowing between the electrodes and the electrical potential between them. The open-circuit voltage and internal impedance of the equivalent Thevenin circuit are computed; the non-dimensional form of these quantities depend only on the angular width of the electrodes. The power expended by the fluid in diffusing through the magnetic field, and the Joule dissipation in the flow are calculated. The Joule dissipation is greater than the dissipation calculated from the net electrode current and the Thevenin internal resistance because of the presence of eddy currents within the fluid. These arise

because the curved electrodes short out part of the induced emf. The effects of these eddy currents may be represented, at least approximately, by a resistance directly shorting the voltage source in the equivalent Thevenin circuit. The efficiency of the channel as an electrical generator is computed. (Author)

PB 156 857 $8.60

Avco-Everett Research Lab., Mass.
A TRANSPORT EQUATION FOR MAGNETOHYDRODYNAMIC WAVES, by Marvin M. Litvak. Rept. on Contract Nonr-2524(00). Aug 60, 92p. 28 refs. Research rept. 92; AD-252 538.

DESCRIPTORS: *Magnetohydrodynamics, Ions, Plasma physics, Transport properties, Equations, Shock waves, Wave analysis, Electrons, Magnetic fields.

The equations for the structure of a steady MHD shock are derived from the wave transport equation but not solved. The shock model is based on the assumption that behind the steady shock is a distribution of fast waves whose pressure is much greater than the gas pressure. The waves scatter with other waves and provide the entropy increase for the jump of conditions across the shock. The particles become thermalized only some distance further back of the shock by means of damping of wave motion into particle motion. Estimates of relaxation times for the wave collision processes are made, and an estimate of the shock thickness, as a function of shock velocity, is made assuming that it is a few wave mean free paths. (Author)

PB 157 490 $5.60

Institute of Engineering Research, U. of California, Berkeley.
FREE MOLECULE FLOW OVER NON-CONVEX SURFACES, by Moustafa T. Chahine. Doctoral thesis. Rept. on Contract Nonr-222(45). 14 Oct 60, 54p. 29 refs. Technical rept. HE-150-177; Series no. 20, issue no. 131; AD-249 434.

DESCRIPTORS: *Superaerodynamics, Molecules, Cylindrical bodies, Spheres, Integral equations, *Aerodynamic configurations, Surfaces, Heat transfer, Gas flow, Dynamics.

The problem of free molecule flow over non-convex surfaces is investigated, and the fundamental integral equations for an infinitely long cylindrical surface with a longitudinal slit and a concave spherical segment are obtained. For purely diffuse reemission the total number flux of particles at any point on the surface is given by a Fredholm type integral equation of the second kind. An energy flux integral equation is obtained which deals with the two cases of perfect and partial surface accommodation. The momentum exchange is formulated, assuming that all recoil particles from an element of surface are reemitted at one effective recoil temperature. For complete surface accommodation this temperature is equal to that of the wall, and finally, normal and axial forces are computed. The integral equations for the two surfaces are solved under the assumption that the incident stream possesses no random thermal motion. Exact, closed form, analytical solutions are obtained for the distribution of the total number flux, the convective heat transfer with perfect and partial surface accommodation. The effect of interreflections is to increase the over-all values of convective heat transfer to the surface while it tends to increase or decrease the net axial forces depending on the concavity of the surface. (Author)

AD-260 269 $5.60

Massachusetts Inst. of Tech., Cambridge.
RESEARCH ON UNSTEADY FLOW, by W. P. Jones and Jerome C. Hunsaker. Rept. on The 1961 Minta Martin Lecture [no. 6]. [1961] 57p. 53 refs.

DESCRIPTORS: *Flutter, Aerodynamics, Gas flow, *Turbulent flow, *Aircraft, Fluid mechanics, Airfoils, Control surfaces, Bibliography.

Aerodynamic aspects of aircraft flutter are treated and the advances that have been made in research on unsteady flow and some of the new problems that have arisen on which further research is required are discussed. Particular attention is given to unsteady boundary layer effects, especially when flow separation is involved. Instabilities that may be induced by separated flow are discussed in some detail and consideration is given to stability problems that may arise with thin highly swept wings at incidence, when leading edge separation may occur.

PB 155 199 $12.50

Naval Supersonic Lab., Mass. Inst. of Tech., Cambridge.
SUPERSONIC DRAG CHARACTERISTICS OF PARTIAL-RING WINGS, by Beverly J. Beane. Doctoral thesis. Sep 60, 172p. 60 refs. Technical rept. 444; AD-253 062.

DESCRIPTORS: *Supersonics, *Ring wings, *Drag, Reduction, Gas flow, Fluid mechanics, Perturbation theory, Fourier analysis, Series, Wings.

The problem of determining the optimum supersonic drag characteristics of lifting partial-ring wings, either alone or in combination with an optimum fuselage, is considered. The analysis is confined to situations which can be described by linearized small-perturbation theory. (Author)

Hydrodynamics, Hydraulics, and Hydrostatics

APEX-670 $0.50

General Electric Co., Cincinnati, Ohio.
DEVELOPMENT OF A DIELECTRIC VALVE AND FLUID, by A. L. Spivak. Rept. on Contracts AF33(600)-38062 and AT(11-1)-171. Aug 61, 13p.

APEX-754 $1.00

General Electric Co., Cincinnati, Ohio.
PRESSURE LOSS COMPUTATIONS IN INCOMPRESSIBLE FLUID FLOW, by J. L. Hobbs. Rept. on Contracts AF 33(600)-38062 and AT(11-1)-171. July 61, 43p.

ANL-6316 $0.75

Argonne National Lab., Ill.
DEVELOPMENT OF REMOTE METALLOGRAPHIC TECHNIQUES FOR IRRADIATED MATERIALS, by R. Carlander. Rept. on Contract W-31-109-eng-38. Sep 61, 32p.

ANL-6113 $2.00

Argonne National Lab., Ill.
EXAMINATION OF URANIUM FROM THE FIRST CORE OF THE EBR-I, by W. F. Murphy, A. C. Klank and S. H. Paine. Rept. on Contract W-31-109-eng-38. Sep 61, 84p.

NAA-SR-6109 $1.50

Atomics International, Canoga Park, Calif.
PERMEABILITY OF METALS AND ENAMELED METALS TO HYDROGEN, by David W. Rudd and J. B. Vetrano. Rept. on Contract AT(11-1)-GEN-8. Oct 61, 57p.

NAA-SR-5833 $0.50

Atomics International, Canoga Park, Calif.
VACUUM INDUCTION MELTING AND CASTING OF THORIUM AND THORIUM-URANIUM ALLOYS, by N. H. Katz, E. G. Kendall and M. H. Binstock. Rept. on Contract AT(11-1)-GEN-8. Oct 61, 25p.

PB 181 081 $1.75

Defense Metals Information Center, Battelle Memorial Inst., Columbus, Ohio.
A SUMMARY OF THE THEORY OF FRACTURE IN METALS, by J. W. Spretnak. Rept. on Contract AF 33(616)7747. 7 Aug 61, 66p. 51 refs. DMIC rept. 157.

DESCRIPTORS: Rocket motor, Containers, Materials, *Metals, *Fracture (Mechanics), Theory, Load distribution, Plastic flow, Shear stresses, Stresses, Temperature, Solids, Crystals, Deformation.

The theoretical strength of metals, based on atomic forces, is in the order of 100 to 1000 greater than that observed. The various reasons for this discrepancy between theoretical and observed strength are discussed in detail, but the more important ones are (1) lattice imperfections, (2) the fact that real metals are polycrystalline aggregates, (3) crystalline anisotropy, and (4) the ability of metals to deform by shear. Plastic flow, particularly heterogeneous plastic flow, is intimately associated with crack initiation. The precise conditions under which plastic flow ceases and bond rupturing (cracking) begins are not completely understood. The body-centered cubic lattice has geometric characteristics that make it particularly susceptible to fracture with little or no preceding plastic flow. Multidirectional stress fields, both microscopic and macroscopic, affect the degree of plastic deformation that precedes crack initiation. The theory of fracture as it exists today is reviewed. Though incomplete in many respects, it can be helpful in understanding the behavior of metal structures. (Author)

GA-2502 $2.60

General Atomic Div., General Dynamics Corp., San Diego, Calif.
A PROGRAM OF RESEARCH ON MECHANICAL METALLURGY AS RELATED TO FUEL-ELEMENT FABRICATION, by T. A. Trozera, K. Koyama and others. Quarterly progress rept. for the period ending 30 June 61 on Contract AT(04-3)-167. Aug 61, 24p.

APEX-744 $0.75

General Electric Co., Cincinnati, Ohio.
INVESTIGATION OF THE EFFECTIVE THERMAL CONDUCTIVITY OF CAST LITHIUM HYDRIDE, by Lindley Manning and David J. McKee. Rept. on Contracts AF33(600)-38062 and AT(11-1)-171. June 61, 36p.

APEX-750 $0.75

General Electric Co., Cincinnati, Ohio.
PROGRAM TO DEVELOP A WROUGHT BLADE SUPERALLOY, by Wilford H. Couts, Jr. Rept. on Contracts AF 33(600)-38062 and AT(11-1)-171. Sep 61, 32p.

APEX-673 $1.75

General Electric Co., Cincinnati, Ohio.
PROPERTIES OF LITHIUM HYDRIDE-V: CORROSION OF AUSTENITIC STAINLESS STEELS IN MOLTEN LiH, by F. H. Welch. Rept. on Contracts AF33(600)-38062 and AT(11-1)-171. May 61, 67p.

PWAC-359 $0.75

Pratt and Whitney Aircraft Div., United Aircraft Corp., Middletown, Conn.
SOLID-STATE METALLURGY STUDIES OF PURE COLUMBIUM AND Cb-1 Zr ALLOY. Rept. on Contract AT(11-1)-229. June 61, 33p.

PB 158 896 $1.60

Research Chemicals, Inc., Burbank, Calif.
RARE EARTH CHALCOGENIDES. Quarterly rept. no. 1, 1 Aug-30 Sep 60, on Contract NObs-84088. [1960] 4p. RC 159.

DESCRIPTORS: *Rare earth compounds, *Thermoelectricity, *Sulfides, *Tellurides, *Selenides, *Intermetallic compounds, Resistance, Zone melting.

Attention has been concentrated upon the following experimental approaches: (a) obtaining of homogenous gadolinium selenide materials of single phase nature; and (b) preparation of other rare earth selenides and determination of their thermoelectric value. (See also PB 158 895)

PB 158 892 $1.10

Research Chemicals, Inc., Burbank, Calif.
REFRACTORY GADOLINIUM AND HAFNIUM COMPOUNDS. Monthly rept. 1-30 Sep 59, on Contract NObs-77145. [1959] 4p. RC 121; ARPA Order no. 81-59; AD-245 924.

DESCRIPTORS: *Gadolinium alloys, *Hafnium alloys, *Intermetallic compounds, Bismuth alloys, Silicon alloys, Electrical properties, Preparation, Temperature, Refractory materials, Gadolinium compounds, Hafnium compounds, *Thermoelectricity, Resistance, Alloys.

Seebeck coefficients at 30, 100, and 200 degrees C were calculated for Gd_3Sb, Gd_2Sb, Gd_3Sb_2+, Gd_3Bi, Gd_4Bi_3, $GdBi_2$, Gd_4Bi_3+, Gd_3Si, Gd_2Si, Gd_4Si_3, GdSi, $GdSi_2$, GdP, Hf_5Si_3, Hf_4Si_3, Hf_6Si_5, and $HfSi_2$. Seebeck values for some specimens in the annealed state are being determined. (See also PB 158 891)

PB 158 889 $1.10

Research Chemicals, Inc., Burbank, Calif.
REFRACTORY GADOLINIUM AND HAFNIUM COMPOUNDS. Monthly rept. 1-30 June 59, on Contract NObs-77145. [1959] 6p. 1 ref. RC 114; ARPA Order no. 81-59; AD-228 637.

DESCRIPTORS: *Gadolinium alloys, *Hafnium alloys, *Intermetallic compounds, Electrical properties, Resistance, Thermoelectricity, *Refractory materials, Alloys, Materials, Antimonides, *Bismuth alloys, *Selenium alloys, Gadolinium compounds, Hafnium compounds.

Investigations of the gadolinium antimonide system were continued. Gadolinium bismuthide compounds were prepared using the same direct reaction technique developed for the gadolinium antimonide system. The preparation of compounds in the gadolinium-selenium system was started. Resistivity determinations on the intermetallic compounds were made by the two-probe technique.

PB 158 890 $1.10

Research Chemicals, Inc., Burbank, Calif.
REFRACTORY GADOLINIUM AND HAFNIUM COMPOUNDS. Monthly rept. 1-31 July 59, on Contract NObs-77145. [1959] 5p. RC 117; ARPA Order no. 81-59.

DESCRIPTORS: *Gadolinium alloys, *Hafnium alloys, *Intermetallic compounds, *Refractory materials, Alloys, Materials, *Antimonides, Resistance, Chemical analysis, *Bismuth alloys, Electrical properties, *Selenium alloys, *Phosphorus alloys, Silicon alloys, Thermoelectricity, Hafnium compounds, Gadolinium compounds.

Chemical analyses have been obtained for most samples in the gadolinium-antimony system. Initial analyses of the gadolinium antimonide compositions prepared by direct reaction and arc melting techniques indicate that the materials are of a heterogeneous composition. Chemical analyses and resistivity data are given for the gadolinium-bismuth system. Electrical data are given for the 2:3 and 3:4 compositions of the gadolinium-selenium system. Preparation of compounds of the gadolinium-silicon and the gadolinium-phosphorus system was started. (See also (PB 158 889)

PB 158 891 $1.10

Research Chemicals, Inc., Burbank, Calif.
REFRACTORY GADOLINIUM AND HAFNIUM COMPOUNDS. Monthly rept. 1-31 Aug 59, on Contract NObs-77145. [1959] 4p. RC 119; ARPA Proj. no. 81-59; AD-245 923.

DESCRIPTORS: *Gadolinium alloys, Antimony alloys, *Intermetallic compounds, Bismuth alloys, Silicon alloys, *Resistance, Chemical analysis, Refractory materials, *Hafnium alloys, Hafnium compounds, Gadolinium compounds, Alloys.

The resistivities at 180 degrees C were calculated for Gd_2Sb, Gd_3Sb_2+, Gd_3Si, Gd_2Si, Gd_4Si_3, GdSi and $GdSi_2$. The chemical analyses and resistivities for various arc-melted Gd-Bi systems are also presented. (See also PB 158 890)

PB 158 893 $1.10

Research Chemicals, Inc., Burbank, Calif.
REFRACTORY GADOLINIUM AND HAFNIUM COMPOUNDS. Monthly rept. 1-31 Oct 59, on Contract NObs-77145. [1959] 5p. RC 122; ARPA Order no. 81-59.

DESCRIPTORS: *Gadolinium alloys, *Hafnium alloys, *Intermetallic compounds, *Refractory materials, Alloys, Materials, Electrical properties, Resistance, *Antimonides, *Bismuth alloys, *Selenium alloys, *Phosphorus alloys, Gadolinium compounds, Hafnium compounds, Melting.

Melting points of the compositions have been determined. Further compositional samples have been prepared to provide checks upon the reproducibility of preparation and data for the gadolinium-antimony, gadolinium-bismuth, and gadolinium-selenium system. Preparation of the gadolinium-phosphorus system has again been attempted employing direct reaction in the arc. (See also PB 158 892)

PB 158 894 $3.60

Research Chemicals, Inc., Burbank, Calif.
REFRACTORY GADOLINIUM AND HAFNIUM COMPOUNDS. Semi-annual rept. 18 May-31 Dec 59, on Contract NObs-77145. [1960] 37p. RC 134; ARPA Order no. 81-59; AD-240 591.

DESCRIPTORS: *Hafnium alloys, Hafnium, *Gadolinium alloys, *Intermetallic compounds, Electrical properties, Resistance, Thermoelectricity, Materials, Melting, Physical properties, Alloys, *Refractory materials.

Gd and Hf compounds are being investigated for thermoelectric power at elevated temperatures. Seebeck coefficient, resistivity, and melting point measurements were made on Gd and Hf refractory compounds containing Se, Si, Sb, Bi, P, and B. The majority of the data obtained from the measurements

are concerned with the Gd-based systems. The Seebeck coefficients varied not only from system to system but also within a given system. Resistivity values varied markedly through compositional ranges; most significant maxima were found at Gd_3Sb_2, $GdBi_2$, Gd_2Se_3, and Gd_4Si_3 compositions. There seemed to be no direct correlation of resistivity values with Seebeck coefficient or with composition, but there did appear to be a trend toward maximum values at intermetallic compound compositions. Mild variations in composition produced marked changes in resistivity values. A change of 0.2% in Gd content reduced resistivity values by some 50% and had only a slightly less marked effect upon Seebeck coefficients values. Melting points were generally high, ranging between 1100° and 3000°C. The Gd-Se compositions appeared most promising. Bi-containing compositions oxidized readily, and the Gd-Sb compositions showed melting points that are too low for use. The Seebeck coefficients for the silicides were considered too low to warrant further examination with either Gd or Hf; similar considerations apply to the Hf-B system. (See also PB 158 893)

PB 158 895 $1.60

Research Chemicals, Inc., Burbank, Calif.
REFRACTORY GADOLINIUM AND HAFNIUM COMPOUNDS. Quarterly rept. 1 Jan-15 Mar 60, on Contract NObs-77145. [1960] 11p. RC 137; ARPA Order no. 81-59; AD-246 005.

DESCRIPTORS: *Refractory materials, *Gadolinium alloys, *Boron alloys, Electrical properties, Phosphorus alloys, Selenium alloys, Preparation, Sintering, Casting, Levitation, *Hafnium alloys, *Intermetallic compounds, Gadolinium compounds, Hafnium compounds, *Thermoelectricity, Resistance, Alloys.

GdB_4 (91.34% Gd, 8.66%B) and GdB_6 (85.7% Gd, 14.3%B) were prepared by arc-melting techniques. Two arc melts were required to form homogeneous buttons and power inputs of 200 to 250 amp, and 15 to 20 v were required. Melting points and Seebeck coefficients were determined for both compounds. Efforts were continued to produce GdP by double-decomposition reaction of Gd and Zn_3P_2 or Ca_3P_2. New processing techniques were developed for the preparation of Gd-Se systems; they included (1) casting in graphite, (2) sintering in inert atmosphere, (3) hot pressing, and (4) levitation melting. (See also PB 158 894)

Ferrous Metals

PB 154 152 $2.60

Naval Weapons Lab., Dahlgren, Va.
EXPLOSION BULGE TEST EVALUATION OF WELDMENTS OF 2" HY-80 STEEL PLATE PRODUCED BY ARMOC STEEL CORPORATION, SHEFFIELD DIVISION, HOUSTON, TEXAS, by W. H. Hall. 4 Jan 61, 27p. NWL rept. no. 1733; AD-249 284.

DESCRIPTORS: *Metal plates, *Welds, *Welded joints, Effectiveness, Steel, Metal joints, Explosion damage, Explosions, Tests, Test methods.

The explosion bulge tests reported herein represent weldments of HY-80 steel plates produced using a double slag electric furnace process. The welding was done using MIL-E-11018 electrodes and employing shipyard techniques developed in connection with submarine construction experience. It was concluded that (1) the steel quality of the base plates appears to be excellent as witnessed by the shear type fractures and the stopping of cracks in the presence of sharp notches at 0 degrees F. The transition temperature from ductile to brittle behavior is apparently well below 0 degrees F, and (2) the welding technique, as practiced by the Ingalls Shipbuilding Corporation, is good in three of the four specimens which satisfactorily passed the explosion bulge testing. The welds had, in some instances, a tendency to separate in the fusion zone, indicating somewhat insufficient welding heat. This may account to some extent for the low ductility found in one specimen. (Author)

PB 181 084 $1.25

Watertown Arsenal Labs., Mass.
TENSILE FRACTURE SURFACE CONFIGURATIONS OF A HEAT-TREATED STEEL AS AFFECTED BY TEMPERATURE, by Frank R. Larson and Frank L. Carr. Rept. on Research of Metals and Nonmetallic materials for Ordnance Construction. July 61, 49p. 18 refs. Technical rept. WAL TR 320.1/5.

DESCRIPTORS: *Steel, Ordnance steel, Heat treatment, Fracture (Mechanics), Microstructure, Tensile properties, Temperature, Tests.

Fractured surfaces of tensile specimens of SAE 4340 steel heat treated to various strength levels and microstructures were examined at a magnification of 20X. Measurements were made of the size of each of three types of fracture-appearance zones present on each specimen. These measurements were correlated with testing temperatures over the range of -196 to + 200 C. Analysis of the quantitative amounts of three elements of fracture present, namely, fibrous, radial shear, and shear-lip, resulted in a descriptive explanation of the initiation and propagation of the fracture. These various modes of fracture zones change their relative size with changing testing temperature, which results in a transitional fracturing behavior in tension similar to that observed in other types of testing. (Author)

Light Metals

SCR-302 $1.75

Brush Beryllium Co., Cleveland, Ohio.
INVESTIGATION AND DEVELOPMENT OF METHODS FOR PRODUCING HIGH-POROSITY BERYLLIUM BODIES, by B. B. Lympany, J. G. Theodore and W. W. Beaver. Final rept. Jan 60, 64p.

SCNC-332 $4.60

Sylvania Electric Products Inc., Bayside, N. Y.
THE FABRICATION OF BERYLLIUM BY HOT ISOSTATIC PRESSING AND BY IMPACT EXTRUSION, by I. Sheinhartz. Rept. on Contract AT(38-1)-200. Sep 61, 43p.

Structural Metallurgy and Corrosion

PB 155 865 $4.60

Naval Weapons Lab., Dahlgren, Va
FRACTURE TOUGHNESS TESTS ON WELDED TITANIUM ALLOYS BEING CONSIDERED FOR THE CHAMBERS OF SOLID-PROPELLANT ROCKETS: Ti-13V-11Cr-3Al ALLOY SAMPLES FROM COMPANY E TESTED FOR EFFECTS OF COLD WORKING AND AGING AND OF INERT-GAS CHILLING OF THE WELD, by H. E. Romine. 21 Apr 61, 49p. 3 refs. NWL rept. no. 1749; AD-254 894.

DESCRIPTORS: *Titanium alloys, Hardening, Aluminum alloys, Chromium alloys, Welding, Welded joints, Fracture (Mechanics), Tests, Vanadium alloys, Rocket cases, Processing, Manufacturing methods, Deformation, Sheets, Rocket motors, Solid rocket propellants, Plastic flow, Welds, Aging, Cooling, Alloys.

Metals are being tested in high yield strength ranges where fracture toughness may have an intermediate value less than the optimum strength-toughness relation for the material. One of the metals considered is the all-beta titanium alloy Ti-13V-11Cr-3Al which can be strengthened to a strength-density ratio of one million and is adaptable to cold shear spinning. Cold working from shear spinning is substituted for part of the strengthening by age hardening. In another technique, the molten puddle of the girth weld is chilled quickly by inert gas to reduce grain size. The samples tested included sheets cold rolled 20% and aged, annealed sheets welded to simulate a girth weld, and a wall sample from a missile case which had successfully passed hydrotest. (Author)

NMI-1251 $8.10

Nuclear Metals, Inc., Concord, Mass.
RESEARCH ON THE MECHANISM OF ZIRCONIUM ALLOY CORROSION IN HIGH-TEMPERATURE STEAM. Part A: Studies on the oxygen gradient in corroding zirconium alloys, by J. P. Pemsler. Part B: Cracking of thick oxide films on zirconium alloys in high-temperature steam, by D. S. Kneppel and J. P. Pemsler. Part C: Thermodynamics of the interaction of zirconium intermetallics with hydrogen and oxygen, by A. G. Tobin and J. P. Pemsler. Rept. on Contract AT(30-1)-1565. Oct 61, 83p.

NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

AD-258 934 $1.60

Aeronautical Materials Lab., Naval Air Material Center, Philadelphia, Pa.
THE DEVELOPMENT OF A PROCEDURE FOR THE DETERMINATION OF HIGHER LEVELS OF ACTIVITY OF GAMMA RADIATION SOURCES, by Alfred L. Glass. Rept. on Proj. TED NAM AE 4428. 15 June 60, 19p. Rept. no. NAMC AML 1129.

DESCRIPTORS: *Gamma rays, *Organic compounds, Radiation damage, Determination, Molecular rotation, Optics, Carbohydrates, Potassium compounds, Sodium compounds, Tartrates, Measurement, Test methods, Saccharides, Dosage, Dosimeters.

An accurate, simple, and inexpensive chemical method of determining the dosage of higher levels of gamma radiation is described. An aqueous solution of d(+) maltose is exposed in a gamma radiating facility for an accurately measured length of time. The decrease in the optical activity from that of the original solution is measured and the dosage obtained from a prepared graph. This procedure was found to be accurate within the range of approximately 2×10^9 to 1×10^{10} ergs $gm^{-1}(C)$. (Author)

PB 155 848 $8.10

Army Signal Research and Development Lab., Fort Monmouth, N. J.
OPERATIONS OF THE FALLOUT GROUP PROJECT 50.3, by W. J. Richards and B. F. Watson. 15 Aug 60, 81p. 1 ref. USASRDL Technical rept. 2088; AD-252 267.

DESCRIPTORS: *Radioactive fall-out, Dose rate, Distribution, Mapping, Test methods.

The Fallout Group was a part of Project 50.3 at Operation Plumbbob, held in Nevada from April to September, 1957. The fallout group was engaged in evaluating, under field conditions, the Signal Corps method of fallout prediction. The group collected the meteorological data necessary to make fallout forecasts, and made plots on a daily basis for each currently scheduled shot. Other duties included conferences and liaison activities. The Signal Corps method of fallout prediction is found to have several shortcomings despite its numerous virtues. The dose rates forecast by the Signal Corps method are compared with the observed dose rates by means of contour charts and graphs of dose rate versus distance along the hot line. (Author)

NAA-SR-1137(Pt. II) $3.60

[Atomics International, Canoga Park] Calif.
ABSOLUTE THERMAL NEUTRON DETERMINATION PART II: ABSOLUTE BETA COUNTING OF INDIUM FOILS, by Roscoe L. Koontz, Moses A. Greenfield, and Alan A. Jarrett. Rept. on Contract AT(11-1)-GEN-8. Oct 55, 36p.

TID-13879 $0.80

Duquesne Light Co., Shippingport, Pa.
ACTIVATION AND TRANSPORT OF LONG-LIVED CORROSION PRODUCTS. Sep 61, 11p. DLCS 1980114 and DLCS 1980115.

PB 158 099 $9.60

High-Energy Physics Lab., Stanford U., Calif.
DESIGN CONSIDERATIONS FOR MAGNETIC SPECTROMETERS, by John F. Streib. Technical rept. on Linear Electron Accelerator Project, Contract N6onr-25116. Nov 60, 117p. HEPL rept. no. 104; AD-252 156

DESCRIPTORS: *Particles, *Particle beams, Magnetic fields, Magnetic properties, Design, *Spectrographic analysis, Costs.

The possibility of reducing the size and cost of a magnetic particle spectrometer without sacrificing quality was studied. The use of alternating strong gradients of the magnetic field was investigated. The mathematical theory of image formation and momentum resolution in strong-field spectrometers was developed in a general form. The economic phase of the problem was discussed generally. The conclusion is that a two-section spectrometer, having first a diverging field (in the plane of symmetry) and then a converging field, would be in many cases an economical arrangement. A quantitative study of the important features of a special but presumably representative family of such field patterns is given, in which the two sections are adjacent and sufficiently extended to contain the source and detector.

UCRL-3717 $1.60

Lawrence Radiation Lab., U. of California, Berkeley and Livermore.
NONADIABATIC EFFECTS IN SINGLE-PARTICLE ORBITS, by A. Garren, L. Henrich and others. Mar 57, 11p.

Instruments and Installations

BNL-5701 $11.50

Brookhaven National Lab., Upton, N. Y.
DESIGN STUDY FOR A 300 - 1000 BEV ACCELERATOR. Aug 61, 161p.

APEX-711 $0.50

General Electric Co., Cincinnati, Ohio.
CURRENT STATUS OF THE AC IONIZATION CHAMBER, by G. K. Rusch. Rept. on Contracts AF 33(600)-38062 and AT(11-1)-171. July 61, 13p.

APEX-639 $0.75

General Electric Co., Cincinnati, Ohio.
THE DEVELOPMENT OF A FAST NEUTRON SPECTROMETER USING SILICON SURFACE BARRIER DIODES, by J. J. Baum. Rept. on Contracts AF 33(600)-38062 and AT(11-1)-171. May 61, 37p.

KAPL-M-PAL-1 $4.60

Knolls Atomic Power Lab., Schenectady, N. Y.
CLIP - THE CYLINDRICALLY LOADED INTEGRATED PLATFORM, by K. A. Kesselring. Rept. on Contract W-31-109-eng-52. June 61, 45p.

KAPL-M-HP-9 $3.60

Knolls Atomic Power Lab., Schenectady, N. Y.
HEALTH PHYSICS QUARTERLY REPORT, Apr-June 61, comp. R. J. Feinberg. Rept. on Contract W-31-109-eng-52.

MURA-629 $0.50

Midwestern Universities Research Association, Madison, Wis.
THE PARMESH DYNAMICS PROGRAM, by Jess Anderson and George Parzen. Rept. on Contract AT(11-1)-384. Sep 61, 11p.

APAE-98 $1.60

Alco Products, Inc., Schenectady, N. Y.
DESIGN CRITERIA FOR IRRADIATED VESSELS TASK 6.8 SUMMARY REPORT. Rept. on Contract AT(30-1)-2639. Sep 61, 26p.

APAE-MEMO-295 $1.60

Alco Products, Inc., Schenectady, N. Y.
ECONOMIC ANALYSIS OF REPLACEMENT CORES FOR SM AND PM TYPE REACTORS, by A. S. Wilder. Rept. on Contract AT(30-1)-2639. Oct 61, 17p.

APAE-84(Addendum II) $5.60

Alco Products, Inc., Schenectady, N. Y.
HAZARDS REPORT FOR INSERTION OF THE PM-1-M-2 ELEMENT IN THE SM-1 CORE II, ed. by J. R. Combe and J. F. Scoles. Rept. on Contract AT(30-1)-2639. Sep 61, 68p.

APAE-84(Addendum III) $1.10

Alco Products, Inc., Schenectady, N. Y.
HAZARDS REPORT FOR SM-1 CORE II WITHOUT THE SM-1 CORE I HIGH BURNUP ELEMENTS AND WITH THE PM-1-M-2 ELEMENT, by J. R. Coombe, D. H. Lee, and F. T. Mathews. Rept. on Contract AT(30-1)-2639. Oct 61, 11p.

APAE-79(Suppl. 1) $2.60

Alco Products, Inc., Schenectady, N. Y.
HAZARDS EVALUATION OF THE SM-1 PENETRATED GASKET, by J. R. Coombe, F. G. Gebhardt, and B. James. Rept. on Contract AT(30-1)-2639. Sep 61, 25p.

APAE-91 $8.10

Alco Products, Inc., Schenectady, N. Y.
STEADY STATE AND TRANSIENT THERMAL AND HYDRAULIC ANALYSIS OF SM-2 TERMINATION REPORT, by I. Segalman and P. L. Bradley. Rept. on Contract AT(30-3)-326. Sep 61, 94p.

TID-13566 $5.60

Allis-Chalmers Manufacturing Co., Washington, D. C.
SPECIFICATION FOR EXPERIMENTAL GAS COOLED REACTOR. Sep 61, 57p.

ANL-6338 $0.50

Argonne National Lab., Ill.
CRITICAL STUDIES OF A DILUTE FAST REACTOR CORE (ZPR-III ASSEMBLY 31), by J. M. Gasidlo, J. K. Long and R. L. McVean. Rept. on Contract W-31-109-eng-38. Oct 61, 25p.

ANL-6360 $2.25

Argonne National Lab., Ill.
ORGANIC NUCLEAR REACTORS: AN EVALUATION OF CURRENT DEVELOPMENT PROGRAMS. Rept. on Contract W-31-109-eng-38. May 61, 104p.

NAA-SR-6706 $1.50

Atomics International, Canoga Park, Calif.
AIMFIRE: A FUEL ECONOMICS CODE, by R. A. Blaine. Rept. on Contract AT(11-1)-GEN-8. Oct 61, 58p.

NAA-SR-6330 $1.50

Atomics International, Canoga Park, Calif.
CALCULATED NUCLEAR PROPERTIES OF LOW-ENRICHMENT METAL-PLATE LATTICES IN THE OMR CRITICAL ASSEMBLY, by R. A. Blaine and J. L. Watts. Rept. on Contract AT(11-1)-GEN-8. Aug 61, 66p.

NAA-SR-MEMO-6151 $5.60

Atomics International, Canoga Park, Calif.
DESIGN CRITERIA AND EXPERIENCE IN NUCLEAR FUEL IRRADIATIONS, by D. G. Harrington. Feb 61, 57p.

NAA-SR-MEMO-2490 $1.60

Atomics International, Canoga Park, Calif.
NUCLEAR CALCULATIONS FOR THE ORGANIC MODERATED CRITICAL FACILITY, by J. J. McClure. Aug 61, 11p.

NAA-SR-MEMO-2587 $2.60

Atomics International, Canoga Park, Calif.
NUCLEAR PARAMETER SURVEY OF MOLYBDENUM-URANIUM ALLOY FUELS FOR THE SHELDON REACTOR, by R. A. Blaine. Mar 58, 27p.

NAA-SR-MEMO-6448 $4.60

Atomics International, Canoga Park, Calif.
PRELIMINARY POPR CONCEPTUAL DESIGN EXCURSION STUDY, by F. J. Halfen. Aug 61, 30p.

NAA-SR-MEMO-6332 $2.60

Atomics International, Canoga Park, Calif.
SECOND LCTL TEST OF HNPF MODERATOR CANS, by E. C. Phillips. Aug 61. 25p.

TID-13696 $7.60

Babcock and Wilcox Co., Lynchburg, Va.
ADVANCED TEST REACTOR CRITICAL EXPERIMENT AT LYNCHBURG, VIRGINIA, by A. L. MacKinney. Hazards summary rept. on Contract AT(10-1)-1075. Aug 61, 74p.

BAW-1221 $2.75

Babcock and Wilcox Co., Lynchburg, Va.
SPECTRAL SHIFT CONTROL REACTOR BASIC PHYSICS PROGRAM. Quarterly technical rept. no. 4, Apr-June 61, on Contract AT(30-1)-2602. 104p.

DP-655 $0.50

du Pont de Nemours, E. I., and Co., Wilmington, Del.
HEAVY WATER MODERATED POWER REACTORS, comp. by L. Isakoff. Progress rept. Aug 61, on Contract AT(07-2)-1. Oct 61, 22p.

DLCS-2130201 $2.60

Duquesne Light Co., Shippingport, Pa.
MODIFIED PURIFICATION SYSTEM PERFORMANCE TEST, CORE I, SEED 2. July 61, 24p.

APEX-723A $1.00

General Electric Co., Cincinnati, Ohio.
GENERAL REACTOR SIZING TECHNIQUES. VOLUME I. PERFORMANCE OPTIMIZATION OF NUCLEAR POWER SYSTEMS OPERATING ON THE BRAYTON GAS CYCLE, by W. Z. Prickett. Rept. on Contracts AF 33(600)-38062 and AT(11-1)-171. June 61, 43p.

APEX-705 $0.75

General Electric Co., Cincinnati, Ohio.
REACTIVITY EFFECTS OF STRUCTURAL MATERIALS IN THE BEM-II B, by K. V. Cooper and W. B. Henderson. Rept. on Contracts AF 33(600)-38062 and AT(11-1)-171. Aug 61, 25p.

APEX-610 $2.25

General Electric Co., Cincinnati, Ohio.
SHIELDING COMPUTER PROGRAM 20-2, by J. E. MacDonald and J. T. Martin. Rept. on Contracts AF33(600)-38062 and AT(11-1)-171. May 61, 101p.

APEX-641 $2.00

General Electric Co., Cincinnati, Ohio.
THERMAL INSULATION DESIGNS FOR GAS-COOL REACTORS, T. D. McLay. Rept. on Contracts AF 33(600)-38062 and AT(11-1)-171. Aut 61, 78p.

KAPL-M-CH-2 $1.10

Knolls Atomic Power Lab., Schenectady, N. Y.
L-42 LOOP CONTROL VALVE FAILURE MTR REACTOR, by C. W. Higby and T. R. Neville. Rept. on Contract W-31-109-eng-52. May 61, 8p.

LAMS-2579 $0.50

Los Alamos Scientific Lab., N. Mex.
CRITICAL MASS MEASUREMENTS OF Oy AND Pu CORES IN SPHERICAL ALUMINUM REFLECTORS, by D. P. Wood and B. Pena. Rept. on Contract W-7405-eng-36. Nov 61, 12p.

LAMS-2557 $1.75

Los Alamos Scientific Lab., N. Mex.
TURRET SHIELDING, by M. E. Battat and J. Bergstein. Rept. on Contract W-7405-eng-36. Oct 61, 73p.

MLM-1081 $6.60

Mound Lab., Miamisburg, Ohio.
PHASE EQUILIBRIA IN THE NaF-BeF_2-UF_4 TERNARY FUSED SALT SYSTEM, by J. F. Eichelberger, C. R. Hudgens and others. Rept. on Contract AT(33-1)-GEN-53. 62p.

CF-61-3-9 $15.50

Oak Ridge National Lab., Tenn.
THORIUM BREEDER REACTOR EVALUATION. PART I. FUEL YIELD AND FUEL CYCLE COSTS IN FIVE THERMAL BREEDERS, by L. G. Alexander, W. L. Carter and others. May 61, 229p.

IDO-16713 $2.00

Phillips Petroleum Co., Idaho Falls.
ORGANIC COOLANT REACTOR PROGRAM. Quarterly rept. 1 Apr-30 June 61, on Contract AT(10-1)-205. Sep 61, 83p.

TID-13308 $8.10

Ramo-Wooldridge, Canoga Park, Calif.
THE NUCLEAR MATERIALS CONTROL SYSTEM. Final rept. on Contract AT(04-3)-165. Dec 60, 86p.

TID-13670 $1.60

Sargent and Lundy Co., Chicago, Ill.
REACTOR CONTAINMENT DESIGN STUDY. Bimonthly progress rept. 15 June-15 Aug 61, on Contract AT(11-1)-938. Aug 61, 11p. SL-1857-5.

DP-651 $0.50

Savannah River Lab., Aiken, S. C.
LIQUID FLOW MONITOR, by B. H. Butler. Rept. on Contract AT(07-2)-1. Oct 61, 6p.

DP-613 $0.50

Savannah River Lab., Aiken, S. C.
PSE-SE MEASUREMENTS ON R-3/ADAM LATTICES, by N. P. Baumann. Rept. on Contract AT(07-2)-1. Sep 61, 25p.

TID-13902 $6.60

Tennessee U. Engineering Experiment Station, Knoxville.
AN ANALOG SOLUTION OF THE SEISMIC VIBRATIONS OF A GAS COOLED REACTOR, by M. W. Milligan. July 61, 67p. ME-61-TN1

Y-1368 $2.25

Union Carbide Nuclear Co., Oak Ridge, Tenn.
THE INFLUENCE OF DESIGN AND PRODUCTION PARAMETERS ON FABRICATION COSTS OF NUCLEAR REACTOR FUEL ELEMENTS, by P. E. Stein, A. C. Ayers and others. Rept. on Contract W-7405-eng-26. Sep 61, 103p.

Y-1366 $0.50

Union Carbide Nuclear Co., Oak Ridge, Tenn.
METAL HYDRIDES FOR SHIELDING APPLICATIONS, by C. W. Hamill, F. B. Waldrop, and H. T. Kite. Rept. on Contract W-7405-eng-26. Oct 61, 15p.

NDA-2131-37 $3.60

[United] Nuclear Corp., White Plains, N. Y.
AMENDMENT I TO PAWLING LATTICE TEST RIG HAZARDS SUMMARY REPORT (NDA-2109-3), by R. Schamberger, G. Foster and W. Brooks. Rept. on Contract AT(30-1)-2303. May 61, 31p.

NDA-2131-42 $1.60

United Nuclear Corp., White Plains, N. Y.
HEAVY WATER-MODERATED POWER REACTOR PROGRAM. Quarterly progress rept. for period end-ind 30 Sep 61 on Contract AT(30-1)-2836. Sep 61, 14p.

NDA-2116-2 $2.60

[United] Nuclear Corp., White Plains, N. Y.
SPONGE FUEL EVALUATION, by J. M. McKee. Quarterly technical rept. for the period ending June 59 on Contract AT(30-1)-2303. Aug 59, 26p.

TID-13868 $4.60

Universal Match Corp., St. Louis, Mo.
INVESTIGATION OF THE EFFECTS OF IONIZING RADIATION ON THE SEDIMENTATION OF SEWAGE. Quarterly rept. no. 3 on Contract AT(11-1)-905. Sep 61, 49p.

Nuclear Reactions

ANL-6423 $0.50

Argonne National Lab., Ill.
MULTIGROUP CALCULATIONS OF EFFECTIVE NEUTRON FRACTION β_{eff}, PROMPT NEUTRON LIFETIME l/ρ, AND RELATED KINETICS PARAMETERS FOR LARGE, FAST, PLUTONIUM-FUELED REACTORS, by H. A. Sandmeier. Rept. on Contract W-31-109-eng-38. Sep 61, 22p.

BNL-694(N-5) $0.50

Brookhaven National Lab., Upton, N. Y.
NEUTRON CROSS SECTION EVALUATION GROUP, by Rudolph Sher and Sophie Moore. Newsletter No. 5, Oct 61. 9p.

APEX-626 $0.75

General Electric Co., Cincinnati, Ohio.
CALCULATION OF THERMAL AVERAGE CROSS SECTIONS, by J. R. Terrall and A. H. Barnett. Rept. on Contracts AF 33(600)-38062 and AT(11-1)-171. June 59, 32p.

APEX-633 $1.00

General Electric Co., Cincinnati, Ohio.
EVALUATION OF BERYLLIUM AND URANIUM CROSS SECTIONS FOR NEUTRON DIFFUSION THEORY CALCULATIONS, by F. G. Dawson. Rept. on Contracts AF33(600)-38062 and AT(11-1)-171. Oct 58, 36p.

APEX-653 $0.75

General Electric Co., Cincinnati, Ohio.
HAND CALCULATION OF SPATIAL DISTRIBUTION OF NEUTRON ACTIVATION, by J. T. Lence, H. R. Kroeger and others. Rept. on Contracts AF33(600)-38062 and AT(11-1)-171. Aug 60, 32p.

APEX-613 $2.25

General Electric Co., Cincinnati, Ohio
PHOTON CROSS SECTIONS, by Mary S. Ferry. Rept. on Contracts AF 33(600)-38062 and AT(11-1)-171. Mar 61, 100p.

IDO-16679 $2.00

Phillips Petroleum Co., Idaho Falls.
DOPPLER BROADENING OF THE LOW ENERGY TOTAL NEUTRON CROSS SECTION OF Pu-241, by O. D. Simpson and N. H. Marshall. Rept. on Contract AT(10-1)-205. Aug 61, 95p.

Radioactivity

TID-13859 $1.10

ENVIRONMENTAL CONCENTRATIONS OF RADIOACTIVE MATERIALS NEAR THE PADUCAH PLANT. Rept. for second quarter 1960. 9p.

TID-13860 $1.10

ENVIRONMENTAL CONCENTRATIONS OF RADIOACTIVE MATERIALS NEAR THE PADUCAH PLANT. Rept. for 1960. 10p.

TID-13861 $1.10

ENVIRONMENTAL CONCENTRATIONS OF RADIOACTIVE MATERIALS NEAR THE PADUCAH PLANT. Rept. for first quarter 1961. 10p.

TID-13851 $2.60

Argonne National Lab., Ill.
ENVIRONMENTAL RADIOACTIVITY AT ARGONNE NATIONAL LABORATORY. July-Dec 60. Summary rept. 21p.

TID-13852 $2.60

Argonne National Lab., Ill.
ENVIRONMENTAL RADIOACTIVITY AT ARGONNE NATIONAL LABORATORY. Summary rept. for 1960. 21p.

TID-13869 $1.10

California U., Los Angeles. School of Medicine.
BACKGROUND AND FALLOUT MONITORING PROGRAM, by Louis B. Silverman. Quarterly summary rept. on Contract AT(04-1)-GEN-12. Feb 61, 4p.

TID-13836(Vol. I, No. 3) $1.10

Combustion Engineering, Inc., Windsor, Conn.
SIC PROTOTYPE REACTOR FACILITY ENVIRONMENTAL MONITORING. Quarterly rept. July-Sep 60, on Contract AT(30-3)-519. Oct 60, 10p.

TID-13837 (Vol. I, No. 4) $1.10

Combustion Engineering, Inc., Windsor, Conn.
SIC PROTOTYPE REACTOR FACILITY ENVIRONMENTAL MONITORING. Quarterly rept. Oct-Dec 60, on Contract AT(30-3)-519. Jan 61, 10p.

TID-13838(Vol. I, No. 5) $1.60

Combustion Engineering, Inc., Windsor, Conn.
SIC PROTOTYPE REACTOR FACILITY ENVIRONMENTAL MONITORING. Annual summary rept. Jan-Dec 60, on Contract AT(30-3)-519. Jan 61, 13p.

TID-13839(Vol. II, No. 1) $1.10

Combustion Engineering, Inc., Windsor, Conn.
SIC PROTOTYPE REACTOR FACILITY ENVIRONMENTAL MONITORING. Quarterly rept. Jan-Mar 61, on Contract AT(30-3)-519. Apr 61, 10p.

TID-13835(Vol. I, No. 2) $1.10

Combustion Engineering, Inc., Windsor, Conn.
SIC PROTOTYPE REACTOR FACILITY ENVIRONMENTAL MONITORING. Quarterly rept. Apr-June 60, on Contract AT(30-3)-519. Sep 60, 8p.

TID-13834 $1.60

Hanford Atomic Products Operation, Richland, Wash.
EVALUATION OF RADIOLOGICAL CONDITIONS IN THE VICINITY OF HANFORD FOR 1960. Rept. on Contract AT(45-1)-1350. 13p.

TID-13929 $1.60

Harrison M. Randall Lab. of Physics, U. of Michigan, Ann Arbor.
β - γ ANGULAR CORRELATION IN THE DECAY OF Sb^{124}, by H. J. Fischbeck and M. L. Wiedenbeck. 13p.

TID-13919 $1.10

Harrison M. Randall Lab. of Physics, U. of Michigan, Ann Arbor.
DECAY OF Nb^{94}, by R. E. Sund, L. I. Yin and others. 7p.

TID-13920 $1.10

Harrison M. Randall Lab. of Physics, U. of Michigan, Ann Arbor.
EXCITED STATES IN Xe^{128}, by R. E. Sund, R. G. Arns and others. 7p.

TID-13841 $1.60

Knolls Atomic Power Lab., Schenectady, N. Y.
ENVIRONMENTAL MONITORING. Quarterly rept. July-Sep 60, on Contract W-31-109-eng-52. Oct 60, 14p.

TID-13842 $1.60

Knolls Atomic Power Lab., Schenectady, N. Y.
ENVIRONMENTAL MONITORING. Quarterly rept. Oct-Dec 60, on Contract W-31-109-eng-52. Jan 61, 14p.

TID-13829 $2.60

Mound Lab., Miamisburg, Ohio.
SUMMARY OF ENVIRONMENTAL MONITORING FOR FIRST QUARTER 1961. Rept. on Contract AT(33-1)-GEN-53. May 61, 23p.

PNROO-DEV-113 $1.10

Pittsburgh Naval Reactors Operations Office, Pa.
ENVIRONMENTAL RADIOACTIVITY AT THE SHIPPINGPORT ATOMIC POWER STATION FOR THE FIRST QUARTER OF 1961. June 61, 9p.

PNROO-DEV-109 $1.10

Pittsburgh Naval Reactors Operation Office, Pa.
SUMMARY OF ENVIRONMENTAL RADIOACTIVITY AT THE BETTIS ATOMIC POWER LABORATORY FOR CALENDAR YEAR 1960. Feb 61, 9p.

PNROO-DEV-111 $1.10

Pittsburgh Naval Reactors Operations Office, Pa.
SUMMARY OF ENVIRONMENTAL RADIOACTIVITY AT THE SHIPPINGPORT ATOMIC POWER STATION FOR CALENDAR YEAR 1960. Mar 61, 9p.

PNROO-DEV-106 $1.10

Pittsburgh Naval Reactors Operations Office, Pa.
ENVIRONMENTAL RADIOACTIVITY AT THE SHIPPINGPORT ATOMIC POWER STATION FOR THE THIRD QUARTER OF 1960. Dec 60, 9p.

PNROO-DEV-110 $1.10

Pittsburgh Naval Reactors Operations Office, Pa.
ENVIRONMENTAL RADIOACTIVITY AT THE SHIPPINGPORT ATOMIC POWER STATION FOR THE FOURTH QUARTER OF 1960. Mar 61, 9p.

Waste Disposal

NAA-SR-MEMO-4620 $3.60

Atomics International, Canoga Park, Calif.
HNPF LIQUID WASTE DISPOSAL COST STUDY, by A. R. Piccot. July 61, 33p.

DLCS-3810201 $1.10

Duquesne Light Co., Shippingport, Pa.
PWR EMERGENCY PLAN DRILL NO. 2. (MINOR WATERBORNE RELEASE OF RADIOACTIVITY.) Sep 61, 10p.

HW-68863 $2.60

Hanford Atomic Products Operation, Richland, Wash.
DISPOSAL FOR NPR DECONTAMINATION WASTES, by W. N. Koop. Rept. on Contract AT(45-1)-1350. Mar 61, 22p.

HW-65540 $1.60

Hanford Atomic Products Operation, Richland, Wash.
SCAVENGING AS A PREDISPOSAL TREATMENT FOR NPR DECONTAMINATION WASTES, by W. N. Koop. Rept. on Contract AT(45-1)-1350. June 60, 16p.

PERSONNEL SUPPLIES AND PERSONAL EQUIPMENT

PB 155 117 $2.60

Naval Supply Research and Development Facility, Bayonne, N. J.
EVALUATION OF THE EMERGENCY BUOYANCY PROPERTIES OF AN EXPERIMENTAL REMOVABLE LINER FOR THE A-1 COLD WEATHER JACKET, by Arthur Price. Nov 60, 30p. Task NT-F015-14-002; Clothing and Textile Div. rept. no. 46; AD-252 512.

DESCRIPTORS: *Protective clothing, Buoyant materials, Foams, Insulating materials, Polymers, Vinyl chlorides, Effectiveness, Tests, Exposure, Clothing.

Test data showed that an experimental polyvinyl chloride foam insulated liner worn with the A-1 cold weather jacket, provided superior and more sustained positive buoyancy to an individual, as compared to the standard quilted acetate batting liner. The complete standard A-1 cold weather outfit including boots, had much greater buoyancy properties than the winter N-1 cold weather outfit, and was able to provide emergency positive buoyancy for short periods of time. The substitution of the new polyvinyl chloride insulated liner

materially increased the positive buoyancy properties of the standard A-1 cold weather outfit, and it is believed that buoyancy characteristics could be maintained indefinitely. The standard A-1 cold weather jacket with the standard liner did not provide sufficient buoyancy when worn with normal utility work clothing and shoes. The standard winter N-1 cold weather clothing, either the complete outfit or the jacket with utility clothing, did not provide any emergency buoyancy. (Author)

PHYSICS

ANL-6420 $0.75

Argonne National Lab., Ill.
GEOMETRICAL CONSIDERATIONS IN THE MEASUREMENT OF THE RATIO L/R IN THE SCATTERING OF POLARIZED NUCLEONS, by J. E. Monahan and A. J. Elwyn. Rept. on Contract W-31-109-eng-38. Sep 61, 33p.

ANL-6391 $4.60

Argonne National Lab., Ill.
PHYSICS DIVISION. Summary Rept. July-Aug 61, on Contract W-31-109-eng-38. 49p.

ARF-1193-3 $2.60

Armour Research Foundation, Chicago, Ill.
SCINTILLATION SPECTROMETER MEASUREMENTS OF CAPTURE GAMMA RAYS FROM NATURAL ELEMENTS, by Reginald C. Greenwood. Rept. on Contract AT(11-1)-578. Oct 61, 31p.

PB 157 897 $1.60

Army Signal Research and Development Lab., Fort Monmouth, N. J.
RELATIONSHIP BETWEEN CONDUCTIVITY AND NUCLEUS CONTENT OF THE AIR IN THE ARCTIC AND THE RESULTS OF SOME MEASUREMENTS, by Lothar H. Ruhnke. Jan 61, 19p. 12 refs. USASRDL Technical rept. 2176; AD-254 654.

DESCRIPTORS: Arctic regions, Greenland, Particles, *Atmospheric electricity, *Air, Density, Conductivity, Measurement, *Air mass analysis, Urban areas, Ionization, *Electrical conductance, Contamination.

In August 1959 measurements were carried out on the icecap in Greenland to determine the conductivity of air and the nuclei concentration of air coming from human settlements. A formula is shown which gives the relation between conductivity, density of large particles, and radius of the particles. With this formula and the measurements, an average radius of 2.7 times 10 to the -6th cm was obtained. The average total conductivity of the air was 5.0 times 10 to the -14th 1/ohms m for air not contaminated by human activity. (Author)

NAA-SR-MEMO-4891 $1.60

Atomics International, Canoga Park, Calif.
FOIL NORMALIZATION, by G. W. Rodeback and R. K. Paschall. Jan 60, 14p.

PB 155 359 $1.60

Avco-Everett Research Lab., Mass.
IONIZATION EFFECTS OF PRECURSOR RADIATION FROM SHOCKS IN AIR, by Peter Hammerling. Rept. on Contract DA 19-020-ORD-4862. June 60, 19p. 13 refs. Research rept. 98; AD-253 228.

DESCRIPTORS: Air, Ionization, *Gas ionization, *Ultraviolet radiation, *Shock waves, Absorption, Measurement.

Observations of ultraviolet radiation from strong shocks in air are analyzed assuming that it comes from the Worley bands of nitrogen. The observed intensity is also compatible with absorption measurements by Wray (Presented at the Eight International Combustion Symposium Aug-Sep 1960) at 1270 A in shocked nitrogen. An f-value of 0.10 is indicated for this system from the absorption measurements. Estimates of precursor ionization produced by this radiation are given with consideration of loss mechanisms. (Author)

ORO-447 $1.60

Florida U., Gainesville.
ON THE TRAPPING OF CHARGED PARTICLES BY MAGNETIC FIELDS, by B. N. A. Lamborn and D. L. Lafferty. Rept. on Contract AT(40-1)-2783. July 61, 15p.

APEX-628 $0.75

General Electric Co., Cincinnati, Ohio.
GAMMA RAY ABSORPTION COEFFICIENTS FOR ELEMENTS AND MIXTURES, by M. A. Capo. Rept. on Contracts AF 33(600)-38062 and AT(11-1)-171. Aug 61, 26p.

APEX-631 $0.50

General Electric Co., Cincinnati, Ohio.
MONTE CARLO RESEARCH SERIES: DIRECTIONAL DIFFUSION COEFFICIENTS FOR A LATTICE GENERATED BY A THREE-REGION HEXAGONAL CELL, by J. R. Beeler and J. D. Popp. Rept. on Contracts AF 33(600)-38062 and AT(11-1)-171. Oct 58, 12p.

APEX-630 $0.50

General Electric Co., Cincinnati, Ohio.
MONTE CARLO RESEARCH SERIES: PRE-SAMPLED ENERGY DEPOSITION METHOD FOR GAMMA HEATING CALCULATIONS, by J. R. Beeler, M. D. McDonald, and J. F. Quinlan. Rept. on Contracts AF33(600)-38062 and AT(11-1)-171. Aug 61, 11p.

APEX-629 $1.25

General Electric Co., Cincinnati, Ohio.
MONTE CARLO RESEARCH SERIES: SLOWING-DOWN PROBABILITY IN A LATTICE GENERATED BY A THREE-REGION CELL OF FINITE LENGTH, by J. R. Beeler and J. L. McGurn. Rept. on Contracts AF33(600)-38062 and AT(11-1)-171. Jan 59, 53p.

APEX-608 $2.75

General Electric Co., Cincinnati, Ohio.
MULTIGROUP, MULTIREGION, ONE-SPACE-DIMENSION PHOTON-DIFFUSION THEORY CALCULATION. PROGRAM FN-GAMMA (ANP PROGRAM NO. 728), by Mary S. Ferry. Rept. on Contracts AF33(600)-38062 and AT(11-1)-171. Apr 61, 146p.

APEX-645 $2.50

General Electric Co., Cincinnati, Ohio.
MULTIGROUP NUCLEAR DATA FOR GE-ANPD COMPUTER PROGRAMS, by R. L. Dough. Rept. on Contracts AF33(600)-38062 and AT(11-1)-171. Feb 61, 130p.

APEX-612 $0.50

General Electric Co., Cincinnati, Ohio.
PHOTOELASTIC STUDY OF CLADDED TUBES, by Dr. R. Guernsey. Progress rept. on Contracts AF 33(600)-38062 and AT(11-1)-171. Feb 61, 24p.

APEX-618 $1.75

General Electric Co., Cincinnati, Ohio.
SYMBOLIC MATRIC TRANSLATOR GE-ANPD PROGRAM FLOCO-V FIELD-TEST FORMULATION, by B. H. Duane. Rept. on Contracts AF33(600)-38062 and AT(11-1)-171. Mar 61, 69p.

HW-70716 $1.50

Hanford Atomic Products Operation, Richland, Wash.
PHYSICS RESEARCH. Quarterly rept. Apr-June 61, on Contract AT(45-1)-1350. July 61, 56p.

NYO-9755 $2.60

Institute of Mathematical Sciences, New York U., N. Y.
THE CANONICAL THEORY OF MOTION OF A CHARGED PARTICLE IN A SLOWLY VARYING ELECTROMAGNETIC FIELD, by Tosiya Taniuti. Rept. on Contract AT(30-1)-1480. June 61, 29p. MF-16.

UCRL-6236 $1.25

Lawrence Radiation Lab., U. of California, Livermore.
A THEORY OF SCATTERING LOSS FROM A MAGNETIC MIRROR SYSTEM, by David J. BenDaniel. Rept. on Contract W-7405-eng-48. Mar 61, 56p.

PB 155 890 $3.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
M. I. T. SOLAR PLASMA EXPERIMENT INSTRUMENTATION, by E. F. Lyon. Rept. on Contract AF 19(604)7400. 14 Apr 61, 40p. Rept. 52G-0017; AD-254 954.

DESCRIPTORS: *Plasma physics, *Density, Measurement, *Instrumentation, *Interstellar matter, Positrons, Particles, Solar atmosphere, Atomic energy levels, *Density sensitive indicators, Hydrogen, Electronic equipment.

The specific aim of the M. I. T. effort is to measure positive ion densities as a function of energy level for interplanetary plasmas consisting mostly of hydrogen. Expected particle densities run from ten to one thousand ions per cubic-centimeter with energy levels from 10 to the 4th to the 6th power meters per second. The sensor consists of a Faraday cup mounted on the side of the vehicle skin. Positive ions, free electrons, and light enter the cup through grid one (which is grounded). Grids two and three are modulating grids, grid four is grounded, and grid five is a suppressor grid. If both grids two and three are at ground potential, the ions and electrons pass through to the region between grids four and five. The electrons can be prevented from reaching the collector (and hence contributing to the measured current) by applying a negative voltage to grid five. Thus, electrons entering the region between grids four and five will be repelled. Positive voltages on grids two or three will have no net effect on electrons. (Author)

PB 158 937 $8.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
ABSORPTION COEFFICIENTS OF AIR, by R. E. Meyerott, J. Sokoloff, and R. W. Nicholls (U. of Western Ontario) Rept. on Contract AF 19(604)3893. July 60, 100p. 50 refs. LMSD-288052, supersedes PB 145 648; Geophysical Research Papers no. 68; GRD-TR-60-277; AD-252 003.

DESCRIPTORS: *Air, Absorption, Tables, *Thermodynamics, Radiation effects.

Tables of integrated absorption coefficients were evaluated for high-temperature air by summation of the contributions from discrete and continuous transitions. The tables were computed for dry air in the temperature range from 1,000 to 12,000 K, at equal energy increments of 0.25 ev (2,016.5 cm. to the -1 power), in the wavelength range from 1,167 A to 19,837 A, and for density ratios relative to sea level at each order of magnitude from 10 to .000001. (Author)

AD-258 769 $8.10

Materials Research Lab., Watertown Arsenal, Mass.
THE ORIGIN OF EFFECTIVE FIELDS IN MAGNETIC MATERIALS, by R. E. Watson (AVCO) and A. J. Freeman. May 61, 89p. 100 refs. MRL rept. no. 99.

DESCRIPTORS: *Magnetic materials, *Magnetic fields, *Ferromagnetic materials, Rare earth compounds, *Garnet, Salts, Fluorides, Oxides, Transition elements, *Iron compounds, Iron, Manganese, Intermetallic compounds, Ions, Atomic orbitals, Nuclear spins, Polarization, *Nuclear physics, Electrons, Quantum mechanics, Ferrites, Spin.

The origin of the effective magnetic fields at the nuclei of magnetic materials which have been determined by Mössbauer, NMR, EPR, specific heat and nuclear polarization methods is investigated theoretically by means of the exchange polarization mechanism. Exchange polarized Hartree-Fock calculations were carried out for (a) free ions and neutral atoms, (b) ions in a (crude) crystalline field (as in a salt), and (c) spin densities and configurations which conform with energy band and neutron magnetic scattering observations for the ferromagnetic metals. The effective field data for metals, ferrites, rare-earth garnets and salts are discussed and it is shown that the dominant contribution to the effective field (in almost every case) arises from the (exchange) polarization of the core electrons by the spin density of the unpaired outer electrons. A restricted Hartree-Fock calculation for Mn^{++} was carried out which is more accurate than existing calculations.

TID-13923 $1.60

Michigan U., Ann Arbor.
TOTAL X-RAY ATTENUATION COEFFICIENTS FROM 40 Kev TO 412 Kev, by M. Wiedenbeck. n.d. 11p.

PB 161 617 $1.00

National Bureau of Standards, Washington, D. C.
ASTROPHYSICAL AND PLASMA PHYSICS RESEARCH AT THE NATIONAL BUREAU OF STANDARDS. HIGHLIGHTS FOR 1961, by L. M. Branscomb, K. E. Shuler, and J. A. Suddeth. Oct 61, 44p. 279 refs. Technical note 116.

DESCRIPTORS: *Plasma physics, *Astrophysics, Bibliography, Atomic spectrum, Interstellar matter, Planetary atmospheres, Thermodynamics, Gases, Solids, Chemical reactions, Air, Transport properties, Photochemistry, Molecular spectroscopy, Ionization.

This report is limited to: (1) a write-up of various new and continuing projects within the program area, (2) a bibliography of selected papers published by NBS authors during the past few years, and (3) a partial biographical list of scientists engaged in research within the area of the astrophysical and plasma physics program. (See also PB 161 560)

IDO-16699 $0.50

Phillips Petroleum Co., Idaho Falls.
COMPILATION OF EGELSTAFF SCATTERING LAW CURVES, by R. M. Brugger. Rept. on Contract AT(10-1)-205. Aug 61, 22p.

SC-4611(RR) $2.60

Sandia Corp., Albuquerque, N. Mex.
DETERMINATION OF SHOCK WAVE AND PARTICLE VELOCITIES FROM SLANTED RESISTOR DATA, by L. M. Barker. May 61, 23p.

Electronics

PB 156 672 $4.60

Case Inst. of Tech., Cleveland, Ohio.
STUDY OF CONTROL OF APERTURE FIELDS. Scientific rept. no. 20, 30 Sep-31 Dec 60, on Contract AF 19(604)3887. 9 Jan 61, 41p. 17 refs. AFCRL 29; AD-252 550.

DESCRIPTORS: *Electromagnetic waves, Discs, Diffraction, Dielectrics, Electric fields, Scattering, Spheres, Electrical networks, Microwave probes, Waveguide slots, *Antennas, Reflectors, Magnetic fields.

Progress is reported on work in the following areas: probe-obstacle interaction in a parallel-plane medium, measurement of surface currents, electromagnetic diffraction by circular disks, anisotropic properties of artificial dielectrics, and network synthesis. (Author)

PB 154 318 $2.60

Electronics Research Lab., U. of California, Berkeley.
OPTIMAL PURSUIT STRATEGIES IN DISCRETE-STATE PROBABILISTIC SYSTEMS, by J. H. Eaton and L. A. Zadeh. Rept. on NSF Grant G-9106. 19 Dec 60, 23p. 16 refs. IER series no. 60 issue no. 334; AD-250 089.

DESCRIPTORS: *Probability, *Servo systems, Automatic, Targets, Statistical analysis, Statistical processes, Control systems, Interception probabilities.

The determination of an optimal interception strategy is considered for the case where the motion of the target state is governed by a Markov process and the transition probabilities of the system are controlled by the input. This problem can readily be reduced to the simpler problem of reaching a fixed specified state from a given initial state at minimum expected cost. Once this restricted problem is solved, it is a simple matter to extend its solution to the case of a moving target state. For this reason, much of the analysis is concerned with the problem of reaching a fixed rather than moving state. (Author)

PB 158 015 $2.60

Laboratory for Insulation Research, Mass. Inst. of Tech., Cambridge.
A FOURIER ANALYZER EMPLOYING HALL EFFECT MULTIPLICATION, by James D. Williams and Stephen P. Denker Rept. on Contract AF 19(604)5482 and Nonr-1841(10). Nov 60, 29p. 5 refs. Technical rept. 157; AD-248 186.

DESCRIPTORS: Fourier analysis. Wave analysis, *Radio waves, Radio signals, Instrumentation, Design, *Electronic equipment, *Electronic circuits, *Hall effect.

A system capable of determining both the magnitude and phase angles of the Fourier components of a periodic signal is described. It employs three basic operations: phase shift, multiplication, and averaging. An active tuned circuit provides the required phase shift; a semiconductor Hall effect device is employed for the multiplication and averaging operations. The system has been tested by analyzing a distorted non-symmetrical square wave (fundamental frequency 100 cps) and comparing the results with measurements made on the same wave form with a commercial wave analyzer and with calculated values. Magnitudes as compared with the wave analyzer agreed within 10% and phase angles as compared with calculated values within 5% for eleven out of twenty harmonics. (Author)

PB 155 598 $2.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
DETECTION OF SIGNALS IN NON-GAUSSIAN NOISE: COMPUTATION RESULTS FOR THE RATIO DETECTOR SYSTEM, by James W. McGinn. Rept. on Contract AF 19(604)7400. 3 Apr 61, 27p. 8 refs. Rept. 47G-0015; AD-254 035.

DESCRIPTORS: *Signal-to-noise ratio, Detection, *Radar signals, *Radar pulses, *Noise (Radio), *Radio signals, Statistical functions, Numerical methods and procedures, Functions, Probability, Statistical analysis, Delay circuits.

Results are presented of computation of probability functions for the detection of pulse signals in a noise background of time varying power. Partial and comparable results are adduced for the ratio detector which is a simplified version of the normalized periodogram detector. These results show that the probability functions for the ratio detector are qualitatively similar to those of the limiting system. A ranking of the detection performance of the three systems studied so far would place the performance of the ratio system roughly midway between the linear and limiting systems. A ratio detector system is defined and the probability functions used in the computation are derived. It is of interest to note that as a secondary result of the calculation the system detection function for signal in a noise background of constant power is derived. The results of computation are presented in the form of graphs of the probability functions. (Author)

ML-813 $3.60

Microwave Lab., Stanford U., Calif.
LOW-FREQUENCY FLUCTUATIONS IN PLASMA: GENERATION MECHANISMS AND THEIR SUPPRESSION, by F. W. Crawford. Rept. on Contract AT(04-3)-326. May 61, 34p.

PB 152 075 $1.60

Stanford Electronics Labs., Stanford U., Calif.
A BALANCED BEAM-TYPE TRAVELING-WAVE FREQUENCY DIVIDER, by D. A. Dunn and R. W. Grow. Rept. on Contract DA 36-039-sc-73178. 10 Aug 60, 20p. 9 refs. Technical rept. no. 189-3.

DESCRIPTORS: *Frequency dividers, *Amplifiers, Regeneration, *Beam power tubes, *Mixer tubes, *Electron beams, Electron tubes.

Results of an experimental study of a hollow-beam helix-type regenerative frequency divider or parametric amplifier are presented. The regeneration at the half-frequency is provided through a feedback loop that includes coupling through the beam of two orthogonal helix modes. This technique is used in order to minimize small-signal regeneration at the half-frequency and to provide the equivalent of a balanced or bridge-type mixer circuit. (Author)

Solid State Physics

IS-336 $9.10

Ames Lab., Iowa State U. [of Science and Tech.]
MICROWAVE MEASUREMENTS OF HALL MOBILITIES IN SEMICONDUCTORS, and G. C. Danielson. Rept. on Contract W-7405-eng-82. Nov 60, 102p.

IS-131 $4.60

Ames Lab., Iowa State U. [of Science and Tech.]
A TEST FOR ELECTRON TRANSFER IN THE INTERMETALLIC COMPOUND, V_4Al_{23}, by Alden Earl Ray and J. F. Smith. Rept. on Contract W-7405-eng-82. Aug 59, 45p.

NAA-SR-6543 $0.75

Atomics International, Canoga Park, Calif.
YIELDING AND FLOW OF SAPPHIRE (α-Al_2O_3) CRYSTALS, by H. Conrad. Rept. on Contract AT(11-1)-GEN-8. Oct 61, 32p.

PB 157 499 $2.60

Laboratory for Insulation Research, Mass. Inst. of Tech., Cambridge.
CONDUCTIVITY IN IRON OXIDES, by David S. Tannhauser. Rept. on Contract Nonr-1841(10). Oct 60, 29p. 25 refs. Technical rept. 154; AD-245 935; AD-245 067.

DESCRIPTORS: *Iron compounds, Oxides, Magnetite; Wustite, Electrical conductance, Thermoelectricity, Conductivity, Electrical properties, Phase transitions, Semiconductors.

The conductivity and thermal emf of wustite and magnetite have been measured as a function of the ratio O/Fe at 1000 degrees C or greater. The conductivity, which shows only a very small temperature dependence, changes slightly on crossing the wustite-to-magnetite phase boundary but decreases rapidly in both phases as the composition approaches stoichiometric FeO and Fe_2O_3, respectively. The thermal emf is p type in wustite of low oxygen content, it changes to n type at high oxygen content and stays n type in magnetite.

PB 158 016 $2.60

Laboratory for Insulation Research, Mass. Inst. of Tech., Cambridge.
THE DISTORTABLE DOUBLE WELL; A PROTOTYPE FOR THE ANALYSIS OF RELAXATION SPECTRA, by R. Fuchs and A. von Hippel. Rept. on Contract Nonr-1841(10). Nov 60, 26p. 17 refs. Technical rept. 156; AD-248 185.

DESCRIPTORS: *Crystals, *Solids, *Electrons, Molecules, *Dipple moments, Dielectric properties, Dielectrics, Electric fields, Analysis, Distortion, Energy, Mathematical analysis.

The origin of dielectric relaxation spectra is frequently not the rotation of dipoles as visualized in the Debye and Onsager models but the reversible transfer of ions or electrons between equilibrium sites. The displacement of such charge carriers corresponds to a reversal of dipole moments and had been treated previously as a shifting of charges between fixed equal or unequal double wells. The reversal of dipole moments in condensed phases, however, frequently has decisive after effects: The electrical unbalance created leads to a compensating action of the surroundings, lowering the free energy and tending to freeze in the charge in the occupied well site. Thus the double well becomes unequal because of the reaction of the embedding medium, which can be described by a time constant and by the final depth of distortion. This model of a distortable double well is here treated, first in its stationary state with and without superposed dc field and then in its ac response. The characteristics of the model are that it incorporates the equal and unequal fixed double well as special cases but in addition shows an inherent distribution of relaxation times and - for long observation periods - an anomalously large polarizability, since eventually the wells can be turned with their deepened sites in the favorable field direction. (Author)

PB 157 380 $2.60

Laboratory for Insulation Research, Mass. Inst. of Tech., Cambridge.
TEMPERATURE AND THICKNESS DEPENDENCE OF THE ELECTRICAL BREAKDOWN STRENGTH OF ALKALI HALIDES, by Lloyd R. Schissler. Rept. on Contract Nonr-1841(10). Sep 60, 23p. 21 refs. Technical rept. 153; AD-245 066.

DESCRIPTORS: *Alkali metal compounds, *Halides, Crystals, *Potassium compounds, *Lithium compounds, Bromides, Fluorides, *Electrical properties, Temperature, Thickness, Thin films, Electric insulation.

Equipment has been built to measure the breakdown strength of crystals with d.c. or impulses ranging from 100 to 0.03 μsec rise time over the range from -150° to 500°C. The breakdown strength of potassium bromide and lithium fluoride was measured from -150°C to 100°C using 1-μsec impulses, and at room temperature with d-c voltages. Evaporated film electrodes were used. An increase in breakdown strength occurred for thin samples of KBr when tellurium diffuse-edge cathodes and gold anodes were used. The breakdown strength was about twice as high for 20-μ than for 100-μ samples. This effect persisted at 100° but was much reduced at -150°C. D-c tests on KBr with Te anodes and Au cathodes showed practically no thickness effect. In LiF, no thickness effect was observable over the range 15-40 μ, possibly because of the large scatter in the results. The highest breakdown strength found for KBr was about 1.1 Mv/cm (26°C, 20 μ thick). Values for thicker samples were about 0.55 Mv/cm. The highest breakdown strength observed in LiF was about 3.3 Mv/cm. (Author)

PB 157 381 $3.60

Laboratory for Insulation Research, Mass. Inst. of Tech., Cambridge.
A TORQUE MAGNETOMETER FOR CRYSTALLINE ANISOTROPY MEASUREMENTS, by Robert P. Hunt, Rept. on Contracts AF 19(604)5482 and Nonr-1841(10). Oct 60, 34p. 14 refs. Technical rept. 155; AD-248 184.

DESCRIPTORS: *Magnetic materials, *Magnetometers, Design, Torque, Measurement, Instrumentation, Analysis, *Single crystals, Crystals.

An instrument designed to measure the torque of magnetic samples automatically and continuously as a function of the angle of an applied magnetic field with respect to the sample is described in detail. General operation of the equipment is outlined, and the system is analyzed on the basis of feedback theory. Results of a temperature run on magnetite and yttrium iron garnet are shown, along with a room-temperature determination of the anisotropy of nickel. Measurements were also made on the induced anisotropy of polycrystalline yttrium iron garnet and associated relaxation phenomena. (Author)

PB 155 100 $4.60

Oklahoma State U. Research Foundation, Stillwater.
INVESTIGATION OF SEMICONDUCTING PROPERTIES OF TYPE IIb DIAMONDS, by Jefferson B. Krumme (Master's thesis) and W. J. Leivo. Technical rept. on Luminescence in Semiconducting Diamonds, Contract AF 18(603)40. Jan 61, 44p. 27 refs. AFOSR-272; AD-252 995.

DESCRIPTORS: *Solid state physics, Optics, *Semiconductors, *Diamonds, *Luminescence, Electrical properties, Surface properties, Intensity, Temperature, Fluorescence.

None of the investigated semiconducting diamonds is found to exhibit fluorescence. Exciting wavelengths used are 364 mμ which excites fluorescence in type I diamond and 225 mμ which is sufficiently energetic to excite carriers across the forbidden energy gap. A red phosphorescence was found during the investigation and observations are included. Each of the investigated specimens exhibits triboluminescence.

Theoretical Physics

PB 152 971 $4.60

Institute of Field Physics, U. of North Carolina, Chapel Hill.
QUANTIZATION OF FIELDS WITH INFINITE DIMENSIONAL INVARIANCE GROUPS, by Bryce S. DeWitt. Rept. on Contracts AF 49(638)563 and Nonr-855(07). Aug 60, 41p. 19 refs. Publication no. 7; AFOSR-TN-60-1199; AD-246 406.

DESCRIPTORS: *Quantum mechanics, Green's function, Transformations (Mathematics), Theory.

A general approach to the problems of quantizing fields which have infinite dimensional invariance groups is given. Space and time are treated on a completely equal footing. A Poisson bracket is defined by means of Green's functions, independently of the discovery or recognition of canonical variables, and is shown to satisfy all the usual identities. In accordance with the measurement theoretical foundations of the quantum theory, the Poisson bracket (i.e., commutator) is defined only for physically measurable group invariants. The Green's functions give a direct description of the propagation of small disturbances arising from a pair of mutually interfering measurements. In order to establish a correspondence between this approach and conventional canonical theory, a motivation for the adopted definition of the Poisson bracket is outlined with the aid of the fundamental theorem of canonical transformation theory. The general theory of wave operators and their associated Green's functions is briefly reviewed. (Author)

PB 155 672 $.160

Lincoln Lab , Mass. Inst. of Tech., Lexington.
MATHEMATICAL FOUNDATIONS OF SCATTERING THEORY, by Reese T. Prosser. Rept. on Contract AF 19(604)7400. 5 Apr 61, 19p. 21 refs. Rept. 55G-0033; AD-254 142.

DESCRIPTORS: *Quantum mechanics, *Particles, Scattering, Theory.

An attempt is made to assemble a coherent description of the mathematical foundations of the quantum theory of particle scattering. The theory is discussed in terms of the free and interaction Hamiltonians and the fundamental Moller wave operators.

PB 155 906 $8.10

Theoretical Chemistry Lab., Indiana U., Bloomington.
THE FIRST EXCITED $^1\sum_g^+$ STATE OF THE HYDROGEN MOLECULE, by Ernest Roy Davidson. Rept. on Contract AF 49(638)318. 1 Mar 61, 85p. 59 refs. AFOSR-483; AD-254 530.

DESCRIPTORS: *Quantum mechanics, *Hydrogen, *Excitation, Molecules, Atomic energy levels, Mathematical analysis Numerical analysis, Atomic orbitals, Functions, Matrix algebra, Molecular spectroscopy, Nuclear energy levels, Atomic spectrum, Theory.

A variation calculation on the first excited state of H2 was conducted using an expansion in elliptical coordinates. All results are reported in Hartree atomic units. The potential function resulting from this calculation is characterized by having two minima, one at R = 1.9 and one at R = 4.3, and a maximum at R = 3.3. The energy obtained at R = 1.9 using a 20 term open-shell covalent type wave function was -0.7162 as compared with the experimental value of -0.7181. At R = 4.3, on the other hand, the best result was obtained with an open-shell wave function including 9 ionic terms and 9 atomic terms. This result of -0.7005 is below the reported experimental value of -0.6935 because the lowest two vibrational levels were not found experimentally. The energy at the top of the barrier was computed to be -0.6844 and probably is as low as -0.6884. The vibrational levels for the potential function have been computed by a numerical integration technique. These are in one-to-one correspondence with the combination of the experimental 1s2s and (2p sigma) superscript 2 levels indicating that both of these sets of levels belong to the first excited state. (Author)

Thermodynamics

NAA-SR-MEMO-6593 $1.60

Atomics International, Canoga Park, Calif.
ANALYSIS OF SOME OF THE EDGE EFFECTS IN SHELL SIDE HEAT TRANSFER, by J. S. McDonald. Aug 61, 18p.

PB 157 937 $3.60

California Forest and Range Experiment Station, Berkeley.
TRANSFER OF HEAT BY FORCED CONVECTION FROM A LINE COMBUSTION SOURCE--THE INFLUENCE OF ATMOSPHERIC STABILITY AND SURFACE ROUGHNESS, by S. Scesa. Interim rept. Feb 57, 40p. 9 refs. AFSWP-865.

DESCRIPTORS: *Heat transfer, *Convection, *Combustion, Heat, Transmission, Atmosphere, Stability, Fluid flow, Surfaces.

Fundamental equations of conservation of mass, momentum, and energy are applied to the problem of heat transmission by forced convection from a line combustion source. The influence of atmospheric stability and surface roughness on growth of the heated zone, decay of temperature downstream from the heat source, and aerodynamic drag is presented. Theory presents groupings of the variables that are common to heat transfer and fluid flow problems concerning the surface air layer. Results reveal that atmospheric stability plays an important role in the growth of the heated region, decay of temperature, and aerodynamic drag for small values of friction velocity and macroviscosity parameter. For large values of these parameters (large surface roughness), atmospheric stability is not important. (Author)

APEX-627 $1.25

General Electric Co., Cincinnati, Ohio.
HEATED ANNULI COMPUTER PROGRAM, by N. Clark, R. N. Noyes, and R. R. Jordan. Rept. on Contracts AF 33(600)-38062 and AT(11-1)-171. Aug 61, 52p.

APEX-640 $1.75

General Electric Co., Cincinnati, Ohio.
TEMPERATURE DISTRIBUTION IN A CYLINDRICAL SOLID WITH SYMMETRICALLY-PLACED LONGITUDINAL COOLANT CHANNELS, by J. F. Heyda and R. G. Herrmann. Rept. on Contracts AF33(600)-38062 and AT(11-1)-171. Apr 61, 72p.

APEX-746 $0.75

General Electric Co., Cincinnati, Ohio.
THERMOELECTRIC STABILITY TESTS, by R. J. Freeman. Rept. on Contracts AF 33(600)-38062 and AT(11-1)-171. July 61, 29p.

TID-13338 $3.60

Michigan U., Ann Arbor.
LOW TEMPERATURE CHEMICAL THERMODYNAMICS OF LANTHANIDE SESQUIOXIDES, by Edgar F. Westrum, Jr. and Bruce H. Justice. Sep 61, 12p.

CF-60-3-12(Suppl.) $4.60

Oak Ridge National Lab., Tenn.
PRELIMINARY HOT SPOT ANALYSIS OF THE HFIR, by Neil Hilvety. Sep 61, 22p.

SCTM-268-60(13) $1.60

Sandia Corp., Albuquerque, N. Mex.
BELLOWS TEMPERATURE RECORDER, by James T. Boag. Sep 60, 15p.

SC-4646(RR) $0.50

Sandia Corp., Albuquerque, N. Mex.
PRESSURE RESPONSE IN A LONG TUBE WHICH IS CLOSED AT ONE END, by M. D. Bennett. Nov 61, 25p.

SC-4640(RR) $0.50

Sandia Corp., Albuquerque, N. Mex.
A SHORT STUDY OF VISCOUS CONSTANT-DENSITY AERODYNAMIC EQUATIONS IN TWO-DIMENSIONAL RECTILINEAR COORDINATES, by W. B. Brooks. Oct 61, 13p.

RESEARCH METHODS, TECHNIQUES AND EQUIPMENT

PB 155 851 $8.60

Army Signal Research and Development Lab., Fort Monmouth, N. J.
REPORT ON THE DETERMINATION OF EXACTNESS OF FIT OF THERMISTORS TO THE EQUATIONS Log $R = A + \frac{B}{T+\Theta}$ AND Log $R = A + \frac{B}{T+\Theta} + CT$, by Layton E. Clark. Jan 61, 97p. 6 refs. USASRDL Technical rept. 2168; AD-251 845.

DESCRIPTORS: *Thermistors, Temperature, Measurement, Functions.

The exactness of fit of the equations Log R equals A + B/(T + Theta) and Log R equals A + B/(T+Theta) + CT has been tested on a well-diversified selection of rod, disk, and wafer themistor types, over all or portions of the temperature range of -60 C to +180 C. Data of these calibrations as well as tabulations of closeness of fit, expressed in temperature units, are presented in tabulated form for the convenience of those who may be considering a given thermistor type for use in a specific temperature-measurement application. (Author)

NSF-61-68 Available from GPO $1.75

Battelle Memorial Inst., Columbus, Ohio.
SPECIALIZED SCIENCE INFORMATION SERVICES IN THE UNITED STATES. A DIRECTORY OF SELECTED SPECIALIZED INFORMATION SERVICES IN THE PHYSICAL AND BIOLOGICAL SCIENCES. Rept. on Contract C-149. Nov 61, 530p. Rept. no. NSF-61-68.

DESCRIPTORS: *Scientific information centers, *Directories, Science, Scientific research, Documentation, Indexes, Scientific organizations, Physics, Biology.

This desk reference for scientists and engineers contains descriptions of 427 scientific information centers that serve information needs in the physical and biological sciences and technology. For each information center listed, it contains a brief description of the area of scientific specialization, the types of information services provided, and publications issued by the organization. A subject index is provided to assist in locating sources of specific information.

PB 158 515 $26.00

Office of Scientific Research and Development.
MASTER SUBJECT INDEX. Summary technical rept. on Contract OEMsr-1131. 1946, downgraded 23 Apr 58, declassified 2 Aug 60, 516p, 9,720 refs; AD-221 601.

DESCRIPTORS: National defense, *Scientific research, *Military research, *Indexes.

This master subject index volume is a consolidation of all the subject matter included in the individual indexes of all divisional, panel, and committee reports, which together constitute the Summary Technical Report of NDRC.

Communication Theory

PB 155 599 $10.10

Lincoln Lab., Mass. Inst. of Tech., Lexington.
ERROR STATISTICS UTILIZING THE CODE TRANSLATION DATA SYSTEM OVER VARIOUS MEDIA, by Erhard J. Hofmann. Rept. on Contract AF 19(604)7400. 28 Mar 61, 124p. 11 refs. Rept. 25G-0026; AD-254 037.

DESCRIPTORS: *Data transmission systems, *Digital systems, Communication systems, *Microwave communication systems, Coding, Statistical analysis, Errors, K-band, Tests, Communication equipment.

In order to obtain the comparative characteristics of the Lincoln Laboratory code translation data system (CTDS) on various digital data transmission media, a series of tests was run from Oct 59-Aug 60 over six private line loop circuits. Three of these were K-carrier circuits; two were microwave TD-2(L-3 carrier) circuits; and one was an H-44 cable. It is

shown that the average error rate for both the K-carrier circuits and the H-44 cable is about 1 bit error in 10^6, and a magnitude higher for the microwave circuits. The number of bit errors per word error varies from below 2 to over 6, the higher number being predominant. The temporal distribution of errors is shown to be of a burst nature interspersed with long quiet intervals. (Author)

PB 158 524 $14.50

Office of Scientific Research and Development. Div. 13.
COMMUNICATION RESEARCH. Summary technical rept. vol. 2A on Contract OEMsr-1131. 1946, declassified 2 Aug 60, 217p. 201 refs. AD-221 599.

DESCRIPTORS: *Communication systems, *Communication theory, *Military communications, *Radio waves, *Frequency modulation, *Amplitude modulation, *Microwave communication systems, *Band-pass amplifiers, *Radiofrequency generators, *Precipitation static, Noise, Aircraft, *Radio interference, *Panoramic scanners, Radar pulses, *Radio jamming, *Radio transmission, Ionospheric disturbances, *Ultra high frequency, *Facsimile recording systems, *Telegraph systems, *Oscillators, Television, *Electron tubes, *Magnetic recording systems, *Sound recording systems, *Quartz crystals, *Frequency, *Diathermy, *Storage batteries, Buoyant materials, Wires, Aircraft, Electric machinery, *Ferrite cores, Materials, Magnetic properties.

Contents:
General communications research: Systems engineering for AAF communications; Propagation studies; Frequency modulation versus amplitude modulation; Microwave communication systems
3,000-Mc communication: Field tests and 3,000-Mc equipment; R-F generator for 2,000 to 3,000 Mc
Precipitation static problems: Precipitation static reduction; Precipitation static research; Effect of aircraft surface treatment; Noise eliminator tests; The block-and-squirter system
Panoramic reception: The fundamentals of panoramic reception; Panoramic receiver with moving-screen indicator; Improved panoramic receiver; Receiver for pulse signals
Interference generation: Study in interference generation; Radio interference generators
Radio transmission forecasting: Ionosphere studies
Apparatus design: U-H-F field-intensity measuring equipment; Aircraft facsimile systems; Ultra-high-speed flash telegraphy; Frequency-stabilized master oscillator; Pickup tube for reconnaissance television; Sound recording on magnetic materials
Miscellaneous studies: Substitutes for natural quartz for frequency control; Shielding for diathermy; Locating faults in wire lines; Storage batteries for cold climates; An electrical cancellation and indicating system; Laying field wire by airplane; Floating insulated wire; Noise investigations; Transient response of band-pass amplifiers; Measurements of magnetic properties of ferrite core materials; Aircraft antenna power, impedance, and tuning-network survey; Bibliography

PB 158 509 $10.50

Office of Scientific Research and Development. Div. 13.
SPEECH AND FACSIMILE SCRAMBLING AND DECODING. Summary technical rept. vol. 3 on Contract OEMsr-1131. 1946, downgraded 23 Apr 58, declassified 2 Aug 60, 140p. 48 refs. AD-221 609.

DESCRIPTORS: *Speech, *Scrambling, Coding, *Speech transmission, *Speech representation, Cryptography, *Facsimile transmission, *Facsimile communication systems, Communication systems, Telegraph systems, *Data transmission systems.

Contents:
Speech scrambling methods
Time division scrambling systems
Speech privacy system development
Unscrambling and decoding methods
Decoding projects
Facsimile privacy systems
Miscellaneous projects
Bibliography

SOCIAL SCIENCES
Documentation

PB 158 905 $1.60

Center for Documentation and Communication Research, Western Reserve U., Cleveland, Ohio.
MINIMUM CRITERIA FOR A COORDINATED INFORMATION SERVICE, by Allen Kent. Technical note no. 10 on Contract AF 49(638)357. 16 Oct 59, 11p. AFOSR-TN-59-1140; AD-229 882.

DESCRIPTORS: *Data processing systems, *Data storage systems, *Documentation, Metallurgy.

A set of minimum criteria for a coordinated information service was prepared in connection with various programs on the machine searching and correlation metallurgical literature conducted by the Center for Documentation and Communication Research. Suggested criteria are listed and factors relating to these criteria which apply to the American Society for Metals pilot machine searching operation are indicated. (Author)

AD-257 307 $4.60

Stanford Research Inst., Menlo Park, Calif.
GRAPHICAL DATA PROCESSING RESEARCH STUDY AND EXPERIMENTAL INVESTIGATION, by A.E. Brain, A. B. Novikoff, and C. P. Bourne. Quarterly progress rept. no. 4, 1 Jan-31 Mar 61, on Contract DA 36-039-sc-78343. Apr 61, 51p. 24 refs. Rept. no. 4, SRI Proj. no. 3192.

This report released by the cognizant military agency for sale to the public 30 Nov 61

DESCRIPTORS: *Data processing systems, Military requirements, *Documentation, *Identification systems, Aerial photographs, Video networks, Data storage systems, *Military research, Analytic geometry, Integrals.

A small pattern-recognition machine is being constructed capable of modification to various schemes of logic. A discussion is presented of some factors affecting the selection of machine design constants. When the pertinent limitations are imposed on the adjustable parameters, the freedom for arbitrary choice becomes very small. Fortunately, preliminary experimental results indicate that the design is practical and apparently free from mutually incompatible boundary conditions. A method is described for sampling the retina in a manner which is no longer random, but achieves a uniform distribution of probability by a specific system of selection. The results of some preliminary tests demonstrate the ability of the machine to discriminate in an environment of super-imposed conflicting data. A discussion is presented of the manner in which size-invariant parameters may be constructed. (Author)

MISCELLANEOUS

PB 171 375 $1.25, $10.00/year

Naval Research Lab., Washington, D. C.
REPORT OF NRL PROGRESS. Dec. 61.

DESCRIPTORS: *Naval research, *Scientific research, Radio astronomy, X-ray diffraction analysis, Crystals, Chemistry, Ethylenes, Fluorides, Polymers, Fluorocarbons, Films, Surface temperatures, Water, Evaporation, Photolysis, Acrylic resins, Electrolysis, Reduction, Metal plates, Porosity, Mechanics, Ablation, Impact shock, Metallurgy, Ceramic materials, Creep, Nickel, Nickel alloys, Alloys, Nuclear power plants, Neutrons, Dosimeters, Oxidation, Balances, Springs, Niobium, Zinc, Nitrogen, Spinels, Stabilization, Steel, Radio, Radio signals, Very low-frequency, Ionosphere, Wave transmission, Solid state physics, Radioactive fall-out, Alkali metal compounds, Space flight, Radiation counters, Sulfides, Color centers, Radiation effects, Cadmium compounds, Detectors, Photoconductivity

Contents:
Articles:
NRL Progress in Radio Astronomy (1960 - 1961), by E. F. McClain
X-Ray Cartography of Cleaved Crystals, by A. B. Wing
Scientific program:
Chemistry: Unusual method for the inorganic microfiber reinforcement of polytetrafluoroethylene (Teflon). Surface activity of fluorinated organic compounds at organic-liquid/air interfaces. Part IV-effect of structure and homology. A force-area study of ovomucoid films. Determination of the surface temperature of water during evaporation studies: a comparison of thermistor with infrared radiometer measurements. Photodegradation of high polymers: photolysis of poly (methyl methacrylate) in vacuum and in air. Formation of porous metal plates by electrolytic reduction.
Mechanics: Analysis of aerodynamic ablation of a metal sphere. Some observations of hypervelocity impact.
Metallurgy and Ceramics: Effect of environment on the tendency of cracks to propagate during the creep of nickel and nickel-base alloys. Neutron dosimetry and long-term irradiation experiments in Army nuclear power plant (SMIA), Ft. Greely, Alaska. A simple recording spring balance for studies of high-temperature oxidation of alloys in water vapor atmospheres. The alloying of niobium-zinc compounds with nitrogen. The stabilization of spinel films on steel to room temperature breakdown in aqueous media.
Radio: Penetration of the ionosphere by vlf radio signals-interim results of the LOFTI I experiment. New station fills gap in U.S. Navy space surveillance complex.
Solid State Physics: Feasibility of fallout radiation meters having cadmium sulphide photoconductive detectors. Coloration of alkali halides under 2 Mev electron irradiation at liquid helium temperature.

A D INDEX

AD No.	Div.
265 500	25
265 501	16
265 502	16
265 505	7
265 506	30
265 507	8
265 508	4
265 509	8
265 510	9
265 513	27
265 514	22
265 515	27
265 518	16
265 519	16
265 520	16
265 521	29
265 522	25
265 523	20
265 524	20
265 525	10
265 526	20
265 528	4
265 531	4
265 532	14
265 533	8
265 535	8
265 536	25
265 537	25
265 541	8
265 546	17
265 547	9
265 548	8
265 549	15
265 550	12
265 552	8
265 554	5
265 555	14
265 556	28
265 557	25
265 558	28
265 559	9
265 561	6
265 562	25
265 563	15
265 566	25
265 567	25
265 569	1
265 570	17
265 572	7
265 573	26
265 576	9
265 577	8
265 580	20
265 581	20
265 582	20
265 583	20
265 584	20
265 585	20
265 586	1
265 588	2
265 593	4
265 594	9
265 595	12
265 596	20
265 599	25
265 602	20
265 603	17
265 604	1
265 605	25
265 606	27
265 607	28
265 613	9
265 614	30
265 615	25
265 616	25
265 617	17
265 618	17
265 619	17
265 620	17
265 622	12
265 624	17
265 625	17
265 626	17
265 627	8
265 628	13
265 630	1
265 631	18
265 632	1
265 633	9
265 634	13
265 635	7
265 636	8
265 637	14
265 638	17
265 641	1
265 642	20
265 643	1
265 645	33
265 646	22
265 647	20
265 648	20
265 652	14
265 654	30
265 655	1
265 656	32
265 657	1
265 658	1
265 659	8
265 660	30
265 661	20
265 662	6
265 663	5
265 664	17
265 665	26
265 666	25
265 667	17
265 668	17
265 669	17
265 670	27
265 671	26
265 672	17
265 673	25
265 674	17
265 675	17
265 676	17
265 677	6
265 678	17
265 679	7
265 680	17
265 681	1
265 682	30
265 683	7
265 684	7
265 685	26
265 686	30
265 687	32
265 688	26
265 689	19
265 690	8
265 691	8
265 692	7
265 693	26
265 694	25
265 695	8
265 696	30
265 697	18
265 698	8
265 699	13
265 700	27
265 701	17
265 702	26
265 703	25
265 704	8
265 705	27
265 706	25
265 707	20
265 708	26
265 709	18
265 710	26
265 711	26
265 712	30
265 713	5
265 714	8
265 715	30
265 716	8
265 717	12
265 718	8
265 719	8
265 720	5
265 721	7
265 722	5
265 723	2
265 724	4
265 726	9
265 728	5
265 729	6
265 730	9
265 731	10
265 732	15
265 733	12
265 734	14
265 735	26
265 739	2
265 740	27
265 741	8
265 746	14
265 747	9
265 751	1
265 753	8
265 754	8
265 755	8
265 756	2
265 757	20
265 758	8
265 759	20
265 762	9
265 763	7
265 764	25
265 765	26
265 770	26
265 771	9
265 772	8
265 773	30
265 774	17
265 775	14
265 776	14
265 777	14
265 779	20
265 781	1
265 782	14
265 787	20
265 788	30
265 789	9
265 790	8
265 791	29
265 792	2
265 793	17
265 794	32
265 795	1
265 796	14
265 797	4
265 798	25
265 799	17
265 800	30
265 801	16
265 802	25
265 803	7
265 804	27
265 805	9
265 806	14
265 807	19
265 808	17
265 809	2
265 810	10
265 811	2
265 812	25
265 813	9
265 814	7
265 815	5
265 816	14
265 817	17
265 819	4
265 821	20
265 822	10
265 823	10
265 824	23
265 826	17
265 827	12
265 828	25
265 829	25
265 831	30
265 834	8
265 836	30
265 837	2
265 839	17
265 840	26
265 841	27
265 842	25
265 843	8
265 844	29
265 845	29
265 846	25
265 848	7
265 849	2
265 850	8
265 851	8
265 852	8
265 853	8
265 854	17
265 855	12
265 856	14
265 857	7
265 860	9
265 861	28
265 865	22
265 866	14
265 867	9
265 869	7
265 870	8
265 872	9
265 877	22
265 878	9
265 879	9
265 880	9
265 881	8
265 882	6
265 884	28
265 885	14
265 887	9
265 888	12
265 889	1
265 890	12
265 891	12
265 892	16
265 893	16
265 894	10
265 895	10
265 896	25
265 897	29
265 900	8
265 901	22
265 902	8
265 903	20
265 904	8
265 913	12
265 914	1
265 915	1
265 916	1
265 917	27
265 918	27
265 920	12
265 922	26
265 923	22
265 924	29
265 925	25
265 926	25

AD No.	Div.
265 927	20
265 929	14
265 930	6
265 931	16
265 933	8
265 935	26
265 936	6
265 941	30
265 943	14
265 947	10
265 948	9
265 949	25
265 950	25
265 951	7
265 956	4
265 961	21
265 962	4
265 963	8
265 965	17
265 969	7
265 971	8
265 972	17
265 973	25
265 976	16
265 977	12
265 980	11
265 982	20
265 983	15
265 984	16
265 986	25
265 987	9
265 988	30
265 989	20
265 990	8
265 991	2
265 992	25
265 994	30
265 995	25
265 996	5
265 998	28
266 001	27
266 003	25
266 004	17
266 005	17
266 006	30
266 007	16
266 009	25
266 010	25
266 011	8
266 012	6
266 013	6
266 014	22
266 015	15
266 016	26
266 017	14
266 019	7
266 020	20
266 021	25
266 022	2
266 023	12
266 025	17
266 026	1
266 027	4
266 028	7
266 029	9
266 033	32
266 034	10
266 036	7
266 037	2
266 038	9
266 039	8
266 040	8
266 041	2
266 043	17
266 044	25
266 048	8
266 049	8
266 050	20
266 051	15
266 052	4
266 053	27
266 054	14
266 062	25
266 063	6
266 064	14
266 065	25
266 066	16
266 067	9
266 069	5
266 070	5
266 071	20
266 072	20
266 073	8
266 074	8
266 076	16
266 077	16
266 078	16
266 079	2
266 080	17
266 081	8
266 082	25
266 084	12
266 085	10
266 086	10
266 087	9
266 088	10
266 089	8
266 092	8
266 094	25
266 095	4
266 097	25
266 098	25
266 099	14

NUMBER INDEX

Number	Page
AD-200 781	S-16
AD-202 663	S-18
AD-221 588	S-16
AD-221 596	S-8
AD-221 599	S-40
AD-221 600	S-12
AD-221 601	S-39
AD-221 604	S-22
AD-221 605	S-14
AD-221 607	S-17
AD-221 609	S-40
AD-227 911	S-18
AD-228 637	S-25
AD-229 882	S-40
AD-232 650	S-2
AD-234 249	S-3
AD-234 270	S-3
AD-237 518	S-18
AD-239 613	S-18
AD-240 591	S-25
AD-244 214	S-20
AD-245 066	S-37
AD-245 067	S-36
AD-245 923	S-25
AD-245 924	S-25
AD-245 935	S-36
AD-246 005	S-26
AD-246 406	S-37
AD-247 860, suppl. 1	S-7
AD-248 022	S-9
AD-248 184	S-37
AD-248 185	S-37
AD-248 186	S-35
AD-249 284	S-26
AD-249 350	S-10
AD-249 351	S-10
AD-249 434	S-23
AD-249 470	S-11
AD-249 612	S-5
AD-249 687	S-6
AD-249 915	S-1
AD-250 035	S-9
AD-250 089	S-35
AD-250 314	S-22
AD-251 273	S-16
AD-251 541	S-6
AD-251 542	S-9
AD-251 845	S-39
AD-252 003	S-34
AD-252 064	S-2
AD-252 156	S-27
AD-252 267	S-27
AD-252 339	S-1
AD-252 457	S-9
AD-252 512	S-32
AD-252 538	S-23
AD-252 550	S-35
AD-252 629	S-6
AD-252 659	S-22
AD-252 827	S-15
AD-252 850	S-21
AD-252 891	S-5
AD-252 953	S-14
AD-252 979	S-17
AD-252 995	S-37
AD-253 062	S-23
AD-253 147	S-2
AD-253 153	S-19
AD-253 171	S-2
AD-253 228	S-33
AD-253 427	S-16
AD-253 463	S-14
AD-253 514	S-15
AD-253 619	S-1
AD-253 854	S-15
AD-253 904	S-20
AD-254 005	S-9
AD-254 035	S-36
AD-254 037	S-39
AD-254 123	S-17
AD-254 142	S-38
AD-254 143	S-7
AD-254 250	S-15
AD-254 261	S-12
AD-254 437	S-16
AD-254 489	S-5
AD-254 530	S-38
AD-254 621	S-13
AD-254 622	S-13
AD-254 623	S-13
AD-254 624	S-12
AD-254 654	S-33
AD-254 655	S-6
AD-254 822	S-10
AD-254 894	S-27
AD-254 923	S-15
AD-254 924	S-15
AD-254 953	S-11
AD-254 954	S-34
AD-254 955	S-11
AD-254 969	S-20
AD-255 767	S-6
AD-255 933	S-14
AD-256 952	S-7
AD-257 307	S-40
AD-258 769	S-34
AD-258 934	S-27
AD-259 144	S-4
AD-260 023	S-11
AD-260 269	S-23
AD-260 742	S-1
AD-261 960 repriced	S-8
AD-262 635 repriced	S-2
AD-262 841	S-21
AD-264 218 repriced	S-11
AFBMD-TR-61-13	S-22
AFC-TM-10-4-61-T	S-14
AFCRL-29	S-35
AFCRL-164	S-13
AFCRL-167	S-15
AFCRL-171	S-13
AFCRL-172	S-13
AFCRL-176	S-12
AFCRL-260	S-5
AFCRL-412	S-7
AFCRL-625	S-1
AFCRL-TN-60-814	S-6
AFCRL-TR-60-277	S-34
AFOSR-272	S-37
AFOSR-292	S-20
AFOSR-483	S-38
AFOSR-1016	S-21
AFOSR-TN-59-1140	S-40
AFOSR-TN-60-1199	S-37
AFSAM-60-31	S-2
ANL-6113	S-24
ANL-6316	S-24
ANL-6338	S-28
ANL-6360	S-29
ANL-6391	S-33
ANL-6420	S-33
ANL-6423	S-30
APAE-79(Suppl. 1)	S-28
APAE-84(Addendum II)	S-28
APAE-84(Addendum III)	S-28
APAE-91	S-28
APAE-98	S-28
APAE-MEMO-295	S-28
APEX-608	S-34
APEX-609	S-21
APEX-610	S-29
APEX-612	S-34
APEX-613	S-31
APEX-617	S-4
APEX-618	S-34
APEX-624	S-19
APEX-625	S-19
APEX-626	S-31
APEX-627	S-38
APEX-628	S-33
APEX-629	S-34
APEX-630	S-33
APEX-631	S-33
APEX-632	S-20
APEX-633	S-31
APEX-635	S-20
APEX-639	S-28
APEX-640	S-38
APEX-641	S-29
APEX-643	S-21
APEX-645	S-34
APEX-653	S-31
APEX-661	S-21
APEX-662	S-21
APEX-665	S-21
APEX-669	S-19
APEX-670	S-23
APEX-673	S-24
APEX-705	S-29
APEX-706	S-20
APEX-708	S-21
APEX-709	S-21
APEX-711	S-28
APEX-715	S-17
APEX-723A	S-29
APEX-744	S-24
APEX-746	S-39
APEX-750	S-24
APEX-754	S-23
ARF-1167-15	S-7
ARF-1193-3	S-33
ARF-3153-6	S-5
ARL-22	S-22
AROD-2165: 4-M	S-22
ARPA Order-81-59	S-25
ARPA Order-81-59	S-26
ARPA SFS-20	S-14
ASRDL-2088	S-27
ASRDL-2147	S-6
ASRDL-2150	S-9
ASRDL-2165	S-6
ASRDL-2168	S-39
ASRDL-2169	S-9
ASRDL-2171	S-9
ASRDL-2173	S-9
ASRDL-2176	S-33
ASRDL-2177	S-6
Avco RR-92	S-23
Avco RR-97	S-22
Avco RR-98	S-33
BAW-1221	S-29
BNL-694(N-5)	S-30
BNL-5541	S-2
BNL-5701	S-28
BRL TN-1367	S-14
CCL-104	S-4
CF-60-3-12 (Suppl.)	S-39
CF-61-3-9	S-30
CF-61-3-129(Rev. 1)	S-8
CRDL SP-2-38	S-2
CRDLR-3063	S-2
CTDS system	S-39
DASA-865	S-38
DLCS-2130201	S-29
DLCS-3360201	S-10
DLCS-3370102	S-10
DLCS-3810201	S-32
DMIC-157	S-24
DOFL TR-858	S-10
DOFL TR-894	S-9
DOPLOC	S-14
DP-613	S-30
DP-626	S-4
DP-642	S-12
DP-651	S-30
DP-655	S-29
DTMB-1037	S-17
ERL-117	S-10
FA M61-12-1	S-15
FA R-1580	S-15
FRL TN-16	S-19
GA-2502	S-24
GAMD-2412	S-4
Grant NSF C-149	S-39
Grant NSF-G7417, TR-5	S-6
Grant NSF G-9106	S-35
GRD GRP-68	S-34
HE-150-173	S-5
HE-150-177	S-23
HEPL-104	S-27
HFRB TRN-110	S-1
HumRRO TR-68	S-1
HW-39938	S-7
HW-65540	S-32
HW-68645	S-3
HW-68863	S-32
HW-68929	S-17
HW-70716	S-34
HW-70768	S-8
IDO-16679	S-31
IDO-16699	S-35
IDO-16713	S-30
IER-20-130	S-5
IER-20-131	S-23
IER-60-314	S-10
IER-60-322	S-10
IER-60-334	S-35
IFP Pub-7	S-37
IMM-NYU-276	S-20
IS-131	S-36
IS-334	S-7
IS-336	S-36
K-436(Del.)	S-4
K-1271(Del.)	S-8
KAPL-M-CH-2	S-29
KAPL-M-EC-4	S-20
KAPL-M-EC-8	S-20
KAPL-M-HP-9	S-28
KAPL-M-JA-6(REV. III)	S-21
KAPL-M-JA-7(Rev. 1&2)	S-21
KAPL-M-JAM-4	S-7
KAPL-M-NPA-23	S-20
KAPL-M-PAL-1	S-28
KAPL-M-SLJ-4	S-8
LAMS-2557	S-30
LAMS-2579	S-29
LIR TR-153	S-37
LIR TR-154	S-36
LIR TR-155	S-37
LIR TR-156	S-37
LIR TR-157	S-35
LL-3G-0002, suppl. 1	S-7
LL-25G-0026	S-39
LL-41-G-0004	S-15
LL-47G-0014	S-11
LL-47G-0015	S-36
LL-47G-0018	S-1
LL-62G-0017	S-34
LL-52G-0018	S-11
LL-54G-0028	S-21
LL-55G-0033	S-38
LL-TR-228	S-11
LMSD-288 052	S-34
MCW-1466	S-8
ML-813	S-36
MLM-1081	S-30
MLM-1115	S-19
MRL(OMRO)-99	S-34
MURA-629	S-28
NAA-SR-1137(Pt. II)	S-27
NAA-SR-5833	S-24
NAA-SR-6109	S-24
NAA-SR-6330	S-29
NAA-SR-6426	S-4
NAA-SR-6441	S-19
NAA-SR-6454	S-19
NAA-SR-6473	S-19
NAA-SR-6543	S-36
NAA-SR-6706	S-29
NAA-SR-MEMO-2490	S-29
NAA-SR-MEMO-2587	S-29
NAA-SR-MEMO-4620	S-32
NAA-SR-MEMO-4891	S-33
NAA-SR-MEMO-6151	S-29
NAA-SR-MEMO-6332	S-29
NAA-SR-MEMO-6448	S-29
NAA-SR-MEMO-6515	S-9
NAA-SR-MEMO-6539	S-19
NAA-SR-MEMO-6593	S-38
NAMC-ACEL-442	S-14
NAMC AML-1129	S-27
NAVWEPS-7597	S-16
NBS-7034	S-22
NBS TN-116	S-35
NDA-2116-2	S-30
NDA-2131-37	S-30
NDA-2131-42	S-30
NMAC TM-61-20	S-2
NMI-1251	S-27
NOLC TM-73-56	S-11
NOTS TA-10	S-16
NOTS TP-2543	S-16
NOTS TP-2552	S-15
NOTS TP-2587	S-16
NPP TMR-184	S-5
NRL MR-1177	S-12
NSF-61-68	S-39
NSL-444	S-23
NSL-452	S-12
NSRDF-46	S-32
NT-F015-14-002	S-32
NWL-1733	S-26
NWL-1737	S-17
NWL-1739	S-20
NWL-1746	S-16
NWL-1749	S-27

Number	Page
NYO-2678	S-21
NYO-2679	S-21
NYO-9341	S-3
NYO-9572	S-4
NYO-9755	S-34
NYO-9804	S-5
ORO-444	S-4
ORO-447	S-33
ORO-465	S-4
ORO-476	S-19
OSURF-778-3	S-7
OTS SB-469	S-17
PB 145 648 see PB 158 937	S-34
PB 152 075	S-36
PB 152 971	S-37
PB 153 484, suppl. 1	S-7
PB 154 152	S-26
PB 154 153	S-11
PB 154 234	S-1
PB 154 318	S-35
PB 154 782	S-16
PB 154 834	S-19
PB 155 016 see PB 152 075	S-37
PB 155 100	S-37
PB 155 116	S-1
PB 155 117	S-32
PB 155 118	S-2
PB 155 199	S-23
PB 155 264	S-15
PB 155 291	S-21
PB 155 292	S-15
PB 155 310	S-22
PB 155 311	S-14
PB 155 317	S-17
PB 155 325	S-9
PB 155 327	S-9
PB 155 355	S-2
PB 155 359	S-33
PB 155 391	S-5
PB 155 467	S-15
PB 155 468	S-1
PB 155 475	S-16
PB 155 538	S-15
PB 155 579 see AD-259 144	S-4
PB 155 582	S-22
PB 155 586	S-9
PB 155 598	S-36
PB 155 599	S-39
PB 155 626	S-14
PB 155 640	S-20
PB 155 654	S-17
PB 155 671	S-7
PB 155 672	S-38
PB 155 727	S-16
PB 155 746	S-10
PB 155 811	S-12
PB 155 826	S-10
PB 155 848	S-27
PB 155 849	S-6
PB 155 850	S-6
PB 155 851	S-39
PB 155 865	S-27
PB 155 889	S-11
PB 155 890	S-34
PB 155 891	S-11
PB 155 893	S-20
PB 155 906	S-38
PB 155 923	S-13
PB 155 924	S-15
PB 155 925	S-15
PB 155 926	S-13
PB 155 927	S-13
PB 155 928	S-12
PB 155 933	S-5
PB 155 948	S-9
PB 155 949	S-9
PB 155 964 see AD-255 933	S-14
PB 156 008 see AD-258 769	S-34
PB 156 019 see AD-255 767	S-6
PB 156 078	S-22
PB 156 413	S-2
PB 156 417 see AD-256 952	S-7
PB 156 627	S-6
PB 156 672	S-35
PB 156 857	S-23
PB 156 906 see AD-258 934	S-27
PB 156 980	S-2
PB 156 982	S-6
PB 157 097 see AD-260 269	S-23
PB 157 315 see AD-260 742	S-1
PB 157 363	S-20
PB 157 380	S-37
PB 157 381	S-37
PB 157 389	S-10
PB 157 489	S-5
PB 157 490	S-23
PB 157 499	S-36
PB 157 631 see AD-260 023	S-11
PB 157 897	S-33
PB 157 937	S-38
PB 157 938 see AD-262 841	S-21
PB 158 015	S-35
PB 158 016	S-37
PB 158 099	S-27
PB 158 216 see AD-257 307	S-40
PB 158 504	S-16
PB 158 505	S-8
PB 158 506	S-16
PB 158 507	S-3
PB 158 508	S-3
PB 158 509	S-40
PB 158 514	S-12
PB 158 515	S-39
PB 158 520	S-17
PB 158 522	S-22
PB 158 523	S-14
PB 158 524	S-40
PB 158 889	S-25
PB 158 890	S-25
PB 158 891	S-25
PB 158 892	S-25
PB 158 893	S-25
PB 158 894	S-25
PB 158 895	S-26
PB 158 896	S-24
PB 158 898	S-13
PB 158 899	S-14
PB 158 900	S-18
PB 158 901	S-18
PB 158 902	S-18
PB 158 903	S-18
PB 158 904	S-18
PB 158 905	S-40
PB 158 937	S-34
PB 161 617	S-35
PB 171 325	S-41
PB 181 081	S-24
PB 181 082	S-12
PB 181 083	S-13
PB 181 084	S-26
PNROO-DEV-106	S-32
PNROO-DEV-109	S-32
PNROO-DEV-110	S-32
PNROO-DEV-111	S-32
PNROO-DEV-113	S-32
PWAC-359	S-24
QMFCIAF-D-323-9	S-18
QMFCIAF-S-501-11	S-18
QMFCIAF S-554, R-20	S-18
QMFCIAF-S-571-7	S-18
QMFCIAF S-581, R -3	S-18
RC-114	S-25
RC-117	S-25
RC-119	S-25
RC-121	S-25
RC-122	S-25
RC-134	S-25
RC-137	S-26
RC-159	S-24
SC-2992(TR)	S-17
SC-4611(RR)	S-35
SC-4640(RR)	S-39
SC-4646(RR)	S-39
SCNC-332	S-26
SCR-302	S-26
SCR-422	S-21
SCTM-91-61(72)	S-5
SCTM-145-61(14)	S-12
SCTM-222A-60(52)	S-6
SCTM-268-60(13)	S-39
SEL TR-189-3	S-37
SMSA SR-50	S-6
SRI-3192-4	S-40
STR-4-1	S-16
STR-5-1	S-16
STR-6-1	S-17
STR-9-1, pts. 1-2	S-3
STR-9-1, pts. 3-6	S-3
STR-10-1	S-8
STR-13-2A	S-40
STR-13-2B	S-12
STR-13-3	S-40
STR-AMP-1	S-22
STR-AMP-2	S-14
TAMC Ref-60-18T	S-6
TED NAM AE-4428, pt. 3	S-27
TEI-795	S-5
TID-13295	S-4
TID-13308	S-30
TID-13338	S-39
TID-13421	S-2
TID-13499	S-4
TID-13566	S-28
TID-13649	S-7
TID-13670	S-30
TID-13696	S-29
TID-13711	S-7
TID-13829	S-32
TID-13834	S-31
TID-13835(Vol. I, No. 2)	S-31
TID-13836(Vol. I, No. 3)	S-31
TID-13837(Vol. I, No. 4)	S-31
TID-13838(Vol. I, No. 5)	S-31
TID-13839(Vol. II, No. I)	S-31
TID-13841	S-32
TID-13842	S-32
TID-13851	S-31
TID-13852	S-31
TID-13859	S-31
TID-13860	S-31
TID-13861	S-31
TID-13864	S-4
TID-13865	S-10
TID-13868	S-30
TID-13869	S-31
TID-13879	S-27
TID-13902	S-30
TID-13903	S-5
TID-13919	S-32
TID-13920	S-32
TID-13923	S-38
TID-13926	S-5
TID-13929	S-31
UCRL-3717	S-28
UCRL-6236	S-34
UCRL-6510	S-21
UCRL-9715	S-3
UMRI-03000-2-T	S-20
WADC TR-59-337, pt. 3	S-13
WADD TN-61-55	S-2
WADD TR-61-50	S-8
WADD TR-61-131	S-11
WAL-320.1/5	S-26
Westing-9160-01102-903(1)	S-13
Y-1366	S-30
Y-1368	S-30

U. S. DEPARTMENT OF COMMERCE FIELD OFFICES

SERVE THE BUSINESS COMMUNITY

The Department of Commerce maintains Field Offices to enable the business community to avail itself locally of Government facilities designed to promote commerce. Working closely with various units in the Department and, when necessary, with other Government agencies, the Field Offices provide business services to manufacturers, wholesalers, retailers, trade publications, trade associations, advertising agencies, research groups, financial institutions, and exporters and importers.

Experienced personnel will gladly assist in the solution of specific problems, explain the scope and meaning of regulations administered by the Department, and provide practical assistance in the broad field of domestic and foreign commerce. Field offices act as official sales agents of the Superintendent of Documents, and maintain an extensive business reference library containing periodicals, directories, publications and reports from official as well as private sources.

Among the many services which businessmen have found of value are:

GENERAL

- Management and business aids
- Establishing a new business

BASIC ECONOMIC DATA

- Census data, with national and often State and regional breakdowns, on manufacturing, wholesaling, retailing, service industries, employment and unemployment, population, housing, agriculture
- Basic records of national income and product, regional trends, balance of payments, foreign aid

MARKETING AND DISTRIBUTION

- Development and maintenance of markets
- Distribution channels, facilities and services
- Marketing and distribution statistics

PRODUCTION

- Modernization of plant processes and other technological aids
- Development of new products
- Government-owned patents for free license
- Commodity standards

FOREIGN TRADE AND INVESTMENT

- Tariff and exchange regulations
- Import and export quotas, licensing regulations
- Statistics on imports and exports
- Investment and trade opportunities abroad
- Economic conditions in foreign countries

COOPERATIVE OFFICES

To make the services of the Department of Commerce more widely available, agreements have been entered into with more than 750 Chambers of Commerce, Manufacturers Associations, and similar business groups under which these organizations have become official Cooperative Offices of the Department. If specific information is not on hand in the Cooperative Office, your problem will be referred to the nearest Departmental field office.

Department Field Offices

ALBUQUERQUE, N. MEX., U.S. Courthouse.
ATLANTA 3, GA., 604 Volunteer Bldg.
BOSTON 10, MASS., Room 230, 80 Federal St.
BUFFALO 3, N.Y., 504 Federal Bldg.
CHARLESTON 4, S.C., Area 2, Sergeant Jasper Bldg., West End Broad St.
CHEYENNE, WYO., 207 Majestic Bldg.
CHICAGO 6, ILL., Room 1302, 226 W. Jackson Blvd.
CINCINNATI 2, OHIO, 809 Fifth Third Bank Bldg.
CLEVELAND 1, OHIO, Federal Reserve Bank Bldg.
DALLAS 1, TEX., Room 3–104 Merchandise Mart.
DENVER 2, COLO., 142 New Customhouse.
DETROIT 26, MICH., 438 Federal Bldg.
GREENSBORO, N.C., 407 U.S. Post Office Bldg.
HONOLULU 13, HAWAII, 202 International Savings Bldg., 1022 Bethel St.
HOUSTON 2, TEX., 610 Scanlan Bldg.
JACKSONVILLE 1, FLA., 425 Federal Bldg.
KANSAS CITY 6, MO., Room 2011, 911 Walnut St.
LOS ANGELES 15, CALIF., Room 450, 1031 S. Broadway.
MEMPHIS 3, TENN., 212 Falls Bldg.
MIAMI 32, FLA., 408 Ainsley Bldg.
MINNEAPOLIS 1, MINN., 304 Federal Bldg.
NEW ORLEANS 12, LA., 333 St. Charles Ave.
NEW YORK 1, N.Y., Empire State Bldg.
PHILADELPHIA 7, PA., Jefferson Bldg.
PHOENIX, ARIZ., 137 N. Second Ave.
PITTSBURGH 22, PA., 355 Fifth Ave.
PORTLAND 4, OREG., 217 Old U.S. Courthouse and P.O. Bldg.
RENO, NEV., 1479 Wells Ave.
RICHMOND 19, VA., 309 Parcel Post Bldg.
ST. LOUIS 3, MO., 2511 Federal Bldg.
SALT LAKE CITY 1, UTAH, 222 SW. Temple St.
SAN FRANCISCO 11, CALIF., Room 419 Customhouse.
SAVANNAH, GA., 235 U.S. Courthouse and P.O. Bldg.
SEATTLE 4, WASH., 809 Federal Office Bldg.

For local telephone listing, consult section devoted to U.S. Government

UNITED STATES
GOVERNMENT PRINTING OFFICE
DIVISION OF PUBLIC DOCUMENTS
WASHINGTON 25, D. C.

OFFICIAL BUSINESS

PENALTY FOR PRIVATE USE TO AVOID
PAYMENT OF POSTAGE, $300